Mathematics

Syllabus

Primary

Grades 3, 4 & 5

Standards Based

Papua New Guinea

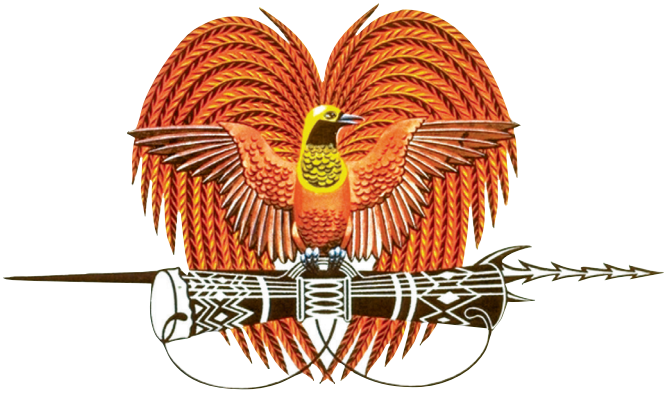
Department of Education

'FREE ISSUE NOT FOR SALE'

Mathematics Syllabus

Primary
Grades 3, 4 & 5

Standards Based



Papua New Guinea
Department of Education

Issued free to schools by the Department of Education

First Edition

Published in 2017 by the Department of Education, Papua New Guinea.

© Copyright 2017, Department of Education, Papua New Guinea.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted by any form or by any means electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the publisher.

Graphic Design & Layout by David Kuki Gerega

ISBN 978-9980-86-568-7

Acknowledgements

This Primary Grades 3, 4 & 5 Syllabus was written by the Curriculum Development Division of the Department of Education and coordinated by Mary Norrie with assistance from the Subject Curriculum Group (SCG).

Teachers, School Inspectors, Teachers College Lecturers, community members and representatives from Non-Government Organisations, (NGOs) assisted in the development of this Syllabus through many workshops, meetings and consultations. They are all acknowledged for their support and contributions.

The Subject Advisory Committee (SAC) and Board of Studies (BOS) are acknowledged for their recommendation and endorsement respectively of this Syllabus for Grades 3,4 & 5.

The Department extends special acknowledgement to Professor Masami ISODA from the University of Tsukuba, Japan for assisting in the initial development of this Syllabus.

Contents

Secretary's Message..... **iv**
Introduction..... 1
Rationale..... 2
Aims..... 3
National Benchmarks..... 4
Curriculum Principles..... 6
Content Overview..... 10
Content Standards..... 12
Content Expansion..... 14
Assessment and Reporting..... 29
Glossary..... 32
References..... 34

Secretary's Message

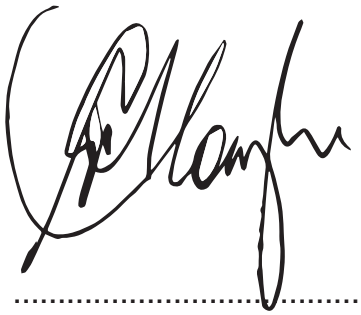
The development of the Primary Mathematics Syllabus is a direct response to the government's directive through the Outcomes Based Education (OBE) exit report, (Czuba 2013). The report recommended for the phasing out of Outcomes Based Curriculum (OBC) and the introduction of Standards Based Curriculum (SBC) to raise standards in teaching and learning at all levels of schooling. The designing of courses in the curriculum have been done through reviewing, aligning, re-aligning and repositioning of the existing content in order to cater for the shift in the pedagogy.

Mathematics is a subject and also one of the Key Learning Areas in the implementation of SBC. It is an important course of study for the development of students' numeracy skills that inspire the mind to think logically, abstractly, critically and creatively whilst nurturing the love for and of Mathematics.

The goal of Mathematics curriculum is to ensure that all students acquire relevant mathematical competencies in order to be compatible locally and globally in meeting the demands of the 21st Century. The Mathematics syllabus for grades 3, 4 & 5 addresses vital mathematical concepts, equity of depth of knowledge for content standards across grades, or poor balance of representation between content concepts and teaching and learning experiences.

Teachers are encouraged to use the guided lessons in the teacher guides and other relevant resources to generate creative teaching and learning activities to deliver the mathematics content to the students.

I commend and approve this Mathematics Syllabus for grades 3, 4 & 5 to be used in all Primary Schools throughout Papua New Guinea.



.....

DR. UKE W. KOMBRA, PhD
Secretary for Education

Introduction

In 2013, the Ministry of Education approved the introduction of Standards Based Curriculum (SBC) to improve the standards in all aspects of education including; curriculum development, teacher training, student and teacher performance, monitoring, school management and leadership.

The overall goal of Standards Based Education is to aim for sustainable development, based on the integral human development of an individual through Standards Based Curriculum in which Mathematics is one of the key learning areas. It is envisaged that, Mathematics at Primary will provide the basis for learning the course and modelling learners to develop love and interest for Mathematics.

The Mathematics curriculum was revised to align the content and the skills to address the declining Mathematics achievement level in Papua New Guinea. The purpose of the Primary Mathematics Syllabus is to help students to acquire basic Mathematical understanding, knowledge, processes and manipulative skills in order for the learners to progressively improve their arithmetic skills over time thus improving the level of numeracy in Papua New Guinea.

This Syllabus contains the national standards students must achieve in grades 3, 4 and 5. These requirement are set in Content Standards and Performance Standards. The Content standards are organised under the following strands; *Number and Operation, Quantities and Measurement, Geometrical Figure and Data and Mathematical Relations.*

The Content Standard Statements in each grade for each strand, describes specific competencies that students should be able to demonstrate upon the teacher's instruction or discovery from their activities. These standards are further reinforced with the performance standards and assessment tasks.

To assist the teachers to implement the standards in the Syllabus effectively, samples of guided lesson plans are provided in the teacher guides.

Primary Mathematics is timetabled for 240 minutes per week for grades 3, 4 and 5. Teachers can use the time allocated to timetable their Mathematics lesson for 30 minutes or 60 minutes depending on the content to be taught.

Rationale

The impact and influence of current developmental and technological trends is significant as Mathematics, Information, Technological Engineering and Science have become driving forces for growing job markets and sustainable development agendas for nations.

This Syllabus was revised in response to the public outcry for the declining standards of education including numeracy rates. Papua New Guinea Government introduced SBC aimed at improving the standards of students' performance through the revision of Papua New Guinea curriculum including Mathematics.

Mathematics is a key learning area that underpins many aspects of everyday life such as making sense of natural patterns, information in various forms to make informed decisions. It requires observation, representation, investigation and comparison of patterns in social and physical happenings.

The plans of the clearly guided curriculum provides the basis of systematic development of mathematical proficiencies, and values in a quest for a deeper and better understanding of the world around us.

Hence, the Mathematics curriculum caters for all 21st century learners, who will think and reason logically, analytically or critically; and become mathematically competent locally and globally overtime.

The Primary Syllabus is organised in such a way that teachers are provided clear purpose and focus on disseminating, assessing and monitoring Mathematics proficiencies. Teaching and learning will be effective if the students on the other hand are well informed of their role and purpose in performing the required Mathematics competencies.

Aims

The overall aim for Mathematics is to enable all students to:

- provide quality mathematics education for all
- think and reason mathematically
- communicate mathematically by collecting, representing, analysing and evaluating information
- apply mathematics processes, knowledge and skills in everyday life
- analyse and solve problems using mathematics
- make connections within mathematics and with other fields
- appreciate mathematics as an essential and relevant part of life
- become numerically literate in their daily lives.

It is vital to support the development of student's proficiencies and competencies as well as the love, appreciation and interest in Mathematics. This will enable them to fully participate effectively and competitively locally and globally.

National Benchmarks

Overarching National Benchmark.

The overarching goal of the mathematics curriculum is to ensure that all students will achieve a level of mastery of mathematical proficiencies and knowledge that will serve them well in life, and nurture the passion for living that emphasise scholastic ability, a rich heart and mind and the harmony of healthy body as envisioned in vision 2050.

Level Benchmark.

By the end of grade five, students should be able to communicate mathematical ideas and thinking and demonstrate systematic approaches in organising and solving mathematical problems. They should gradually develop and apply proficiency from Grade 3 to Grade 5.

Grade Benchmarks

Grade 3 Standards

By the end of grade 3 all students should achieve the following standards:

- Recognise, read, write and compare large numbers used in based 10 number value system.
- Add and subtract numbers in vertical form with and without carrying two place.
- Multiply and divide numbers in vertical form.
- Add and subtract simple fraction.
- Measure distance using the standard units of measurement metre (*m*) and kilometre (*km*).
- Use units of weight; grams (*g*), kilograms (*kg*) and tonne (*t*) in given situations.
- Use seconds, minutes, and hour to measure duration of time.
- Convert hour to minutes and to seconds.
- Solve everyday problems on time duration.
- Understand value of notes and coins and solve various money problems.
- Use the properties of triangles to make patterns.
- Identify and name the properties of circles and spheres.
- Read and write mathematical sentences in addition, subtraction and multiplication.
- Use rules of division in simple calculation.
- Collect and represent data on tables and graphs.

Grade 4 Standards

By the end of grade 4 all students should achieve the following standards:

- Compare, estimate and represent larger numbers and explain relative size of numbers using tape diagrams, number line and place value chart.
- Represent decimal numbers using base 10 materials.
- Compare and explain the relative size and structure of decimal numbers using measuring tools.
- Compare areas of rectangles and squares and explain how to represent the area with numbers.
- Use tape diagrams and measuring containers to represent fractions larger than one (1).
- Use mathematical sentence, tape diagrams and objects to find rules of calculation.
- Use line graphs to represent the changes in various situation.

Grade 5 Standards

By the end of grade 5 all students should archive the following standards:

- Add and subtract decimal numbers with whole numbers.
- Multiply and divide by decimals.
- Explain various fractions and meaning of percentages.
- Calculate fractions and percentages.
- Find the volume of solids and area of triangles and quadrilaterals.
- Calculate mean of quantities.
- Calculate the angle sum of different polygons and identify the properties of circles.
- Sketch the prisms and cylinders.
- Investigate and explain the simple relationship of proportionality.
- Use ratio to make comparisons based on given information.

Curriculum Principles

Curriculum principles identify, describe and focus attention on the important concerns that must be addressed when developing the curriculum at all levels of schooling. They are based on significant cultural, social and educational values and beliefs.

The principles of the Standards Based Curriculum (SBC) include the following:

- A clear focus on the exit of learning attainments after each grade level
- Clear, understandable, consistent and progressive of learning development
- Aligned with the National Education Standards which are also aligned to the college, career pathways or other lifelong living after school
- Built upon the strengths and lessons learnt from Outcome Based Curriculum.

Papua New Guinea National Curriculum Standards are based on the following underpinning principles:

1. Integral Human Development.
2. Our Way of Life.
3. Teaching and Learning.
4. Mathematics Guiding Principles.

1. Integral Human Development

The Philosophy of Education for Papua New Guinea as described in the *Matane Report* acknowledges the National Goals and Directive Principles in the National Constitution and is consistent with Vision 2050 and Education for Sustainable Development.

Papua New Guinea is a rapidly changing society and faces many challenges. To face these effectively, an individual must strive to become an integrated person and to work with others to create a better community.

The process of Integral Human Development calls for a National Curriculum, which helps individuals to:

- identify their basic human needs
- analyse situations in terms of these needs
- see these needs in the context of spiritual and social values of the community and
- take responsible action in co-operation with others.

The success of a National Curriculum requires the integrated involvement of all the agents of education such as the home, church, school, and community. Within the National Curriculum, the teachers must integrate knowledge, skills, values and attitudes to allow students to achieve the desired standard expectations of Integral Human Development.

2. Our way of Life

Cultural relevance focuses on the richness and diversity of Papua New Guinean cultures and languages. These cultures and languages are examined within their own unique contexts and within historical, contemporary, and future realities. Our traditional life is based on a holistic perspective that integrates the past, present and future. Papua New Guineans are the original inhabitants of Papua New Guinea and live in sophisticated, organised, and self-sufficient societies. Our customs and traditions constitute a cultural mosaic, rich and diverse, including different cultural groups. Our customs and traditions are unique and are featured in the National Curriculum. Therefore, the National Curriculum should enable students to:

- demonstrate, understand and practice the values, beliefs, customs, and traditions of Papua New Guinea
- demonstrate, understand and apply the unique Papua New Guinean communication systems
- demonstrate and recognise the relationship between Papua New Guineans and the global communities
- recognise, accept and practice Papua New Guinean arts as forms of cultural expression
- give examples of the diversity and functioning of the social economic, and political systems of Papua New Guineans in traditional and contemporary societies and
- describe the evolution of human rights and freedoms as they relate to the people of Papua New Guinea.

3. Teaching and Learning

The expectations for all students set forth through the *National Curriculum Standard Framework* strongly emphasise intellectual discipline and high standard attainments through relevant curriculum content, The Standards Based Curriculum intends for a different approach to teaching and learning for all students. This approach emphasises the connections between subject areas and the skills to be acquired and used overtime. The students should develop the ability to reason, solve problems, apply knowledge, and communicate effectively. It also requires that instructional practices encourage students to learn from active, independent inquiry into life situations; and, assumes that they become catalysts for students to pursue lifelong quests for learning and continuous growth.

In short, this approach to teaching and learning demands teachers to understand and apply the *Standards for Teaching and Learning* to the educational environment they create in schools and classrooms. The *Standards for Teaching and Learning* are higher-order thinking, deep knowledge, substantive conversation, and connections to the world.

4. Mathematics Guiding Principles

The Mathematics curriculum principles identify, describe and focus attention on the important concerns that must be addressed when developing and implementing the Mathematics subject. They are based on significant cultural, social and education values, beliefs and norms. The Curriculum Principles also assist in identifying the knowledge, skills and processes and values explicitly stated in the Content Standards.

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, actively building new knowledge from experience and prior knowledge. Mathematical ideas should be explored in ways that stimulate curiosity, create enjoyment of Mathematics, and develop depth of understanding. 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 recognise the importance of reflecting on their thinking and learning from their mistakes. According to scholars, students become competent and confident in their ability to tackle difficult problems and willing to preserver when tasks are challenging (NCTM, 2000). Therefore, students should be actively engaged in doing meaningful Mathematics, discussing Mathematical ideas, and applying Mathematics in interesting, thought-provoking situations such as asking close and open questions and set real life problems.

Equity

An excellence in mathematics education requires 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.

Curriculum

A curriculum is more than a collection of activities; it must be coherent, focused on important mathematics, well-articulated across the grades. In a coherent curriculum, mathematical ideas are linked to and build on one another so that students' understanding and knowledge deepen and their ability to apply mathematics expands. An effective mathematics curriculum focuses on important mathematics that will prepare students for continued study and for solving problems in a variety of school, home, and working settings. A well-articulated curriculum challenges students to learn increasingly more sophisticated mathematical ideas as they continue their studies.

Assessment

Assessment should support the learning of important mathematic concept and furnish useful information to both teachers and students When assessment is an integral part of mathematics instruction, it contributes significantly to students' mathematics learning. Assessment should inform and guide teachers as they make instructional decisions. The tasks teachers select for assessment convey a message to the students about what kind of mathematical knowledge and performance are valued. Feedback from assessment task helps students' in setting goals, assuming responsibility for their own learning, and becoming more independent learners.

Technology

The use of technology is an essential tool to facilitate teaching and learning. It influences the way mathematics is taught and enhances students' learning. However, technology should not be used as a replacement for basic understanding of arithmetic knowledge and skills. It should be used to foster knowledge, skills and processes in mathematics.

Content Overview

The content overview consists of four strands. The Strands are used as organisers of standards and content to assist teachers with planning, programming, assessment and reporting.

Strand

Grades 3 to 5 Strands include: *Number and Operation (NO), Quantities and Measurement (QM), Geometrical Figures (GF), Data & Mathematical Relations (DMR).*

Strand1. Number and Operation

The strand ***"Number and Operation (NO)"*** consists of the contents that describe the meaning and representation of numbers such as integers, decimal numbers, fractions, and methods of calculation. This strand depicts the understanding of mathematics concepts, skills, processes and usage of the symbols, key terms and mathematical phrases that provides the basis for the proceeding strands.

Strand 2. Quantities and Measurement

The strand ***"Quantities and Measurement (QM)"*** is mainly about units and measurements of quantities surrounding us in daily life. It involves students discovering and formulating various measures and appropriate units of measurement. This helps students develop skills to measure. This strand includes length, area, volume, time, weight and angle. It depicts the usage of appropriate tools and units for calculating various measures.

Strand 3. Geometrical Figures

The strand ***"Geometrical Figures (GF)"*** consists of geometric figures beginning with the descriptions of features, properties and the structures of geometrical figures such as plane and solid figures. It also include drawing of two-dimensional (2D) shapes in static, three-dimensional (3D) objects and dynamic situations starting with planes and solid figures.

Strand 4. Data and Mathematical Relations

The strand ***"Data and Mathematical Relations (DMR)",*** emphasises on number patterns and number relationships leading to investigation of ways that one quantity changes relative to another and addresses the need to understand, interpret and analyse information displayed in tables and graphs. This strand also pose relevant questions and to design ways of investigating students' experiences and interests.

Topics Overview

The table below outlines the strands and topics for the Primary Grade 3,4 & 5. It shows the progressive development of concepts from Grade 3 to 5 linking to Grade 6 mathematics content.

The table shows what students should learn and achieve in each strand at each grade.

Strands	Topics		
1. Number and Operation	**Grade 3**	**Grade 4**	**Grade 5**
	Large numbers	Larger numbers	Addition and subtraction of fraction
	Addition and subtraction in vertical form	Rounding off to whole numbers	Multiplication and Division of Fractions
	Multiplication in vertical form	Division in vertical form	Decimal Numbers and whole numbers
	Introduction of division	Rules and order of calculations	Multiplication and Division of Decimal numbers
	Introduction of Fraction	Introductions of Decimal numbers	Size and Equivalent Fractions
	Addition and Subtraction of proper fraction	Decimal numbers and their calculations	Introduction to percentage
		Fraction larger than One	
		Multiples and divisors	
2. Quantities and Measurement	Metre and Kilometre	Units of Area	Area of triangle and quadrilaterals
	Units of weight (*g,kg, t)*	Area of Squares and Rectangles	Units of Volumes
	Time and Duration	Sizes of Angles	Measurement Per Unit. (Mean)
	Calculation of money		Congruent triangles, Quadrilaterals and Polygons
3. Geometrical Figures	Triangles and their Properties	Quadrilateral as Plane figure	Regular polygon
	Circles and Spheres	Rectangular Prisms and Cubes	Diameter and circumference of circles
			Solids and their Properties
4. Data and Mathematical Relations	Mathematical sentence using Box	Quantities which change together	Proportion (Two changing quantities)
	Rules of division for Proportionality	Line Graphs	Using Ratio for Comparison
	Collect and Represent Data.	Arrangement of Data	Percentage of Data

Content Standards

The table below is an overview of content Standards for each grade. The Content Standards are organised in strands and shows the progress of learning content from one grade to another. The Standard Statement comprises of a set of facts, concepts and ideas that are important for students to attain.

Grade 3	Grade 4	Grade 5
Strand 1 Number and Operation		
3.1.1 Extend learned numbers and place value to read and write numbers up to 1,000 000 and more.	**4.1.1** Extend learned number and place value to read, write, and order numbers up to 10 million and more.	**5.1.1** Apply the process of addition and subtraction to add and subtract the fractions with different denominators.
3.1.2 Extend learned addition and subtraction to add and subtract 2 to 4 digit numbers.	**4.1.2** Understand the meaning of approximation and rounding numbers.	**5.1.2** Extend learned multiplication and division to multiply and divide decimal numbers by whole number.
3.1.3 Extend learned Multiplication to multiply numbers up to 3 digit numbers by one digit number in vertical form.	**4.1.3** Extend learned division to divide by two digit numbers in vertical form.	**5.1.3** Use base 10 system representation to compare and convert whole number to decimal numbers.
3.1.4 Extend learned multiplication to multiply numbers up to 3 digit numbers by 2 digit numbers in vertical form.	**4.1.4** Apply learned division to divide numbers in vertical form.	**5.1.4** Apply the process of multiplication to multiply decimal numbers by a decimal number and whole number by a decimal number.
3.1.5 Develop the understanding of partative and quotient divisions and divide by one digit divisor.	**4.1.5** Understand the rules and order of calculation in a mathematical expression.	**5.1.5** Apply the process of division to divide a decimal number by decimal number and a whole number by a decimal number.
3.1.6 Extend learned division and different situations to divide with remainders for one divisor.	**4.1.6** Understand the meaning of decimals, add and subtract numbers with one decimal place.	**5.1.6** Extend their understanding of fractions and their calculations to compare size fraction.
3.1.7 Extend learned knowledge on simple fractions to define and represent the given quantities, the size and structure of fractions.	**4.1.7** Extend the understanding of structure of decimal numbers to represent decimal numbers up to two decimal places.	**5.1.7** Understand and calculate simple percentages, and express them as fractions and decimals.
3.1.8 Apply process of addition and subtraction to add and subtract proper fractions with same denominators.	**4.1.8** Extend learned multiplication and division to multiply and divide decimal numbers by whole number.	
	4.1.9 Extend the understanding of Addition and subtraction to add and subtract fractions larger than one with same denominator.	
	4.1.10 Understand the properties of numbers and apply such properties to identify the component of numbers.	

Strand 2 Quantities and Measurement		
3.2.1 Use their understanding of metre and measure longer distances in Kilometres.	**4.2.1** Understand the meaning of units of area and represent areas with numbers.	**5.2.1** Develop the formula to calculate areas of parallelogram,triangle,trapezium,rhombus and understand their transformation.
3.2.2 Develop rational understanding of quantities in the units of weights (g),(kg) and (t).	**4.2.2** Explore area of squares and rectangles such as centimetre square (cm^2), meter (m^2)and develop formulae to calculate area.	**5.2.2** Understand the units of volume and develope the formula of volume and measure.
3.2.3 Develop the understanding of time in hours, minutes and second and apply in their daily activities.	**4.2.3** Understand the units of large area and represent the area with numbers.	**5.2.3** Understand the meaning of mean and measurement per unit and apply it to solve problems.
3.2.4 Understand the value of various notes and coins as part of a unit and multiples of unit money and solve various money problem situations.	**4.2.4** Explore and develop the understanding of measurement of angles, how to construct and measure angles.	
Strand 3 Geometrical Figures		
3.3.1 Investigate the properties of various types of triangles and how to draw beautiful patterns through tessellate.	**4.3.1** Investigate and understand properties of various types of quadrilaterals using vertex, angles, sides, parallel lines, perpendicular lines and diagonals.	**5.3.1** Investigate and understand the properties of congruent triangles and quadrilaterals.
3.3.2 Investigate the properties of circle and sphere.	**4.3.2** Investigate and understand the properties of rectangular prisms and cubes in terms of faces and edges and make models of them.	**5.3.2** Investigate and construct regular polygons and identify the properties of angles.
		5.3.3 Explore common properties of circles and develop formula of circumference, diameter and radius.
		5.3.4 Investigate and identify the properties of solids (Prism and cylinders).
Strand 4 Data and Mathematical Relations		
3.4.1 Represent a mathematical sentence using words and box (□) to find the missing number using addition and multiplication and their inverse operation.	**4.4.1** Explore quantities changing together and explain the patterns by sum, difference, product, and quotient.	**5.4.1** Explore proportions in two changing quantities and explain the patterns by using the relation of direct proportionality.
3.4.2 Explore the different rules of division and find its relationship to multiplication and express as mathematical sentences.	**4.4.2** Extend learned knowledge on tables and graphs to represent data and read line graphs.	**5.4.2** Extend their understanding of data to construct graphs using given scales and quantities.
3.4.3 Develop understanding ways to collect, arrange and represent data on tables and bar graphs.	**4.4.3** Explore how to draw and read multi variable data by two dimensional tables.	**5.4.3** Use percentage and compare data sets of different sizes.

Content Expansion

Grade 3

Strand 1: Number and Operation

Topic: **Large Numbers**

Content Standard	**3.1.1** Extend learned numbers and place value to read and write numbers up to 1,000 000 and more.
Performance Standards	a. Explore the structure of large numbers and how to read them. (10 sets of 1000). b. Read, write and represent large numbers in numerals using base 10 place value charts. c. Use base 10 place value and arrows to represent and compare the relative size of numbers on a number line using inequality signs (< >), and explain the relative size of numbers.
Assessment Tasks	1. Write given numbers in word or figures. 2. Write numbers in order of size and numerical value. 3. State the value of an underline digit in a given number. 4. Write given numerals in expanded numbers form.

Topic: **Addition and Subtraction in Vertical Form**

Content Standard	**3.1.2** Extend learned addition and subtraction to add and subtract 2 to 4 digit numbers.
Performance Standards	a. Based on the addition and subtraction of 2 digit numbers in vertical form and extend the addition and subtraction up to four digit numbers. b. Calculate with and without carrying and borrowing by the process of addition and subtraction in vertical form. c. Add and subtract within 1000 using algorithms and strategies based on place value and the properties of operations.
Assessment Tasks	1. Students use the process of addition and subtraction in column to write the sum or difference of two and three digit whole numbers. 2. Solve simple word problems.

Topic : **Multiplication in Vertical Form**

Content Standard	**3.1.3** Extend learned Multiplication to multiply numbers up to 3 digit numbers by one digit number in vertical form.
Performance Standards	a. Explore easier ways of multiplying 40 x 3 using 4 x 3 and 200 x 2 using 2 x 2 from memorising their multiplication tables. b. Multiply 2 - 3 digit numbers by 1 digit number. c. Explain the ways of multiplication in vertical form using blocks.
Assessment Tasks	1. Complete a written exercise on multiplication. 2. Ask individual students to say the row of 3,5 and 10, if they cannot say, teacher assist students to memorise multiplication table once more.

Content Standard	**3.1.4** Extend learned multiplication to multiple numbers up to 3 digit numbers by 2 digit numbers in vertical form.
Performance Standards	a. Interpret products of whole numbers, *e.g.* interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. b. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (*e.g.*9 × 80, 5 × 60) using strategies based on place value and properties of operations. c. Multiply 2 digit numbers by 2 digit numbers in vertical form. d. Multiplication 3 digit numbers multiply by 2 digit numbers in vertical from.
Assessment Tasks	1. Complete a written exercise on multiplication. 2. If students cannot multiply 2 digit numbers by 2 digit numbers, teacher assist students to memorise, the Multiplication tables and multiply 1 digit number.

Topic: **Introduction of Division**

Content Standard	**3.1.5** Develop the understanding of partative and quotient divisions and divide by one digit divisor.
Performance Standards	a. Represent and interpret quotient and partative division in a context in which number of objects are shared equally. b. Extend division with 1 and 0. c. Use properties of operations as approaches to multiply and divide.
Assessment Tasks	1. Make picture book for dividing equally. 2. Make a picture book for getting number for distribution. 3. Complete simple exercises on division.

Content Standard	**3.1.6** Extend learned division in different situations to divide with remainders for one divisor.
Performance Standards	a. Divide numbers with remainder for one divisor. b. Confirm the answers of division using multiplication and addition. c. Perform division with reminders.
Assessment Tasks	1. Solve various problems of division with remainders.

Topic: **Introduction of Fraction**

Content Standard	**3.1.7** Extend learned knowledge on simple fractions to define and represent the given quantities, the size and structure of fractions.
Performance Standards	a. Explain the meaning and representations of fractions of a whole quantity. b. Represent given quantities in fractions with two meanings of division: • dividing into equal parts and getting number of equal parts and • use the structure of fractions as the remaining part. c. Represent fractions on a number line and compare the size.
Assessment Tasks	1. Represent fractions with denominators of 3, 5, 6, 7, 9 and 10. 2. Divide a strip paper tape into equal parts by equally scaled lines in the exercise book. 3. Draw pictures of 1 litre to represent fractions. 4. Use equality and inequality signs to compare fraction.

Topic: **Addition and Subtraction of Proper Fraction**

Content Standard	**3.1.8** Apply process of addition and subtraction to add and subtract proper fractions with the same denominators.
Performance Standards	a. Represent addition of fractions on a tape diagram. b. Add proper fractions with same denominators. c. Represent addition of fractions on a tape diagram. d. Subtract proper fractions with same denominators.
Assessment Tasks	1. Draw tape diagrams of addition and subtraction of proper Fraction. 2. Add and subtract fractions with same denominator.

Strand 2: Quantities and Measurement

Topic: **Metre and Kilometre (m, km)**

Content Standard	**3.2.1** Using the understanding of metre measure longer distances in Kilometres.
Performance Standards	a. Estimate and compare lengths of objects. b. Measure and record lengths of a variety of objects and distances using appropriate metric units (m, km) for everyday objects. c. Calculate and carry out simple unit conversion within a system of measurement (centimetres to meter and metre to Kilometre). d. Estimate and calculate the length of an object.
Assessment Tasks	1. Complete a written exercise to decide which unit to use for different situations. 2. Convert smaller units to bigger units and vice-vesa.

Topic: **Units of Weight (g,kg,t)**

Content Standard	**3.2.2** Develop rational understanding of quantities in the units of weights (g),(kg) and (t).
Performance Standards	a. Explore ways to compare weights through direct comparison, indirect comparison and arbitrary unit. b. Estimate, compare, measure and record the weight of a wide variety of objects using appropriate metric units (g, kg, and t). c. Calculate and carry out simple unit conversion within a system of measurement (grams to kilograms).
Assessment Tasks	1. Student compare the weight of objects. 2. Students convert grams to Kilograms and Kilograms to grams. 3. Add and subtract weights.

Topic: **Time and Duration**

Content Standard	**3.2.3** Develop the understanding of time in hours, minutes and second, and apply in their daily activities.
Performance Standards	a. Explore how to represent short time (second). b. Do simple time calculations of length of time in minutes, hours, half hours and quarter hours . c. Explore how to represent 24 hour time using the time table schedule. d. Use calendars to calculate and describe lengths of time in a day, week and months e. Converting between seconds, minutes, hours days , weeks and months.
Assessment Tasks	1. Record time for a given situation. 2. Calculate units of time. 3. Write time in 24 hour time. 4. Express length of time in an activity.

Topic: **Calculation of Money**

Content Standard	**3.2.4** Understand the value of various notes and coins as part of a unit and multiples of unit money and solve various money problem situations.
Performance Standards	a. Explain the value of one Kina coin by using various notes and other coins. b. Compare various prices of items to buy, sell and give change in various notes and coins. c. Choose coins and notes to show simplest way to make certain amount. d. Use various situations to find the total cost and the remaining amounts. e. Solve problems involving multiplication, and division of money amounts by using whole-number multipliers and divisors.
Assessment Tasks	1. Show simplest way to make certain amounts. 2. Solve problems involving addition, subtraction. 3. Multiplication, and division of money amount by using whole-number multipliers and divisors.

Strand 3: Geometrical Figures

Topic: **Triangles and their Properties**

Content Standard	**3.3.1** Investigate the properties of various types of triangles and draw beautiful patterns through tessellate.
Performance Standards	a. Explain the properties of triangles (*e.g. sides, vertex and angles*) and name triangles by its properties. b. Draw and name triangles with a given properties. c. Designing patterns through tessellation of triangles and enjoy created patterns.
Assessment Tasks	1. Use compass and ruler to draw triangles of given properties. 2. Tessellate triangles and create different patterns.

Topic: **Circles and Spheres**

Content Standard	**3.3.2** investigate the properties of circle and sphere.
Performance Standards	a. Explore how to draw a circle given the radius. b. Use a given situation to identify the properties of circles. c. Using a compass to draw different patterns and picture of circles. d. Explain how a circle looks like when it is viewed from all directions.
Assessment Tasks	1. Draw circles with a given radius or diameter. 2. Draw circles and show on the circle the diameter, circumference and radius.

Strand 4: Data and Mathematical Relations

Topic: **Mathematical Sentence Using Box (□)**

Content Standard	**3.4.1** Represent a mathematical sentence using words and box □ to find the missing number using addition and multiplication and their inverse operation.
Performance Standards	a. Represent mathematical sentences for a given situation with the support of a tape diagram. b. Find the unknown number in the □ for the mathematical sentence of addition using inverse operation of addition. c. Find the unknown number in the □ for the mathematical sentence of multiplication using inverse operation of multiplication.
Assessment Tasks	1. Find unknown numbers in mathematical sentences of addition and multiplication. 2. Represent unknown number in a mathematical sentence by using □.

Topic: **Rules of Division for Proportionality**

Content Standard	**3.4.2** Explore the different rules of division and find its relationship to multiplication and express as mathematical sentences.
Performance Standards	a. Investigate and explain rules of division from a given situation. b. Use the rules of division for easier ways of calculation.
Assessment Tasks	1. Use the rules of division for finding the answer of the division.

Topic: **Collect and Represent Data.**

Content Standard	**3.4.3** Develop understanding of ways to collect, arrange and represent data on tables and bar graphs.
Performance Standards	a. Explain ways of collecting and representing data with drawing tables and bar graphs. b. Investigate and collect data of things in and around the environment. c. Produce, read and interpret 2 dimensional tables and graphs.
Assessment Tasks	1. Explain how to collect data of students. 2. Represent data in a table. 3. Draw a bar graph of the data collected.

Grade 4

Strand 1: Number and Operation

Topic: **Larger Numbers**

Content Standard	**4.1.1** Extend learned number and place value to read, write, and order numbers up to 10 million and more.
Performance Standards	a. Recognize, read and write 7 digit numbers using every three digit reading number system.(1000, 1000 000, 10 000 000). b. Represent, read, write and order numbers up to 10 000 000, using base 10 place value. c. Using base 10 place value explain the relative size of numbers and represent them appropriately on number line. d. Compare the relative size of numbers using inequality signs (< >). e. Read, write and compare the population figures of different provinces in PNG.
Assessment Tasks	1. Students write given numbers in word or figures. 2. write numbers in order of size. 3. State the value of an underline digit in a given number.

Topic: **Rounding off to Whole Numbers**

Content Standard	**4.1.2** Understand the meaning and use of approximation, estimate and rounding numbers.
Performance Standards	a. Explain the term round number, rounding up and down and give rough estimates on appropriate situations. b. Use greater or equal to 5 and less than 5, and understand the difference between less than and equal to 5. c. Develop simple rules to round off numbers for 10, 100, 1000 and 10,000. d. Round whole numbers up and down at tens , hundreds, thousands, ten thousand, or hundred thousand places and recognise their different values and discuss numbers such as 579,580,600,1000 and 474, 470,500,0.
Assessment Tasks	1. Complete an exercise on rounding numbers to 10s, 100s and 1000s 10000s, places. 2. Student discussion about the ways of rounding numbers.

Topic: **Division in Vertical Form**

Content Standard	**4.1.3** Apply the process of division to calculate division in verticle form.
Performance Standards	a. Understand the relationship between mathematical sentence of division and division in vertical form. b. Explain the process in vertical form using given situation of division. c. Calculate division in vertical form with 2-3 digit number divided by 1 - digit. d. Use tape diagram and table to identify multiplication or division for a given situation.
Assessment Tasks	1. Explain the meaning of process dividing in vertical form. 2. Explain and show the procedures of dividing in vertical form. 3. Explain tape diagram and tables for division and multiplication.

Content Standard	**4.1.4** Extend learned division to divide by 2 digit numbers in vertical form.
Performance Standards	a. Extend the division in vertical form divided by 2 digit numbers. b. Apply estimation of quotient of division in vertical form. c. Use rules of division and multiplication for easier ways of get answer for mathematical sentence. d. Use the tape diagrams and tables to distinguish the situations of multiplication and division.
Assessment Tasks	1. Explain and show the process of dividing in vertical form. 2. Explain tape diagram and tables for division and multiplication.

Topic: **Rules and Order of Calculations**

Content Standard	**4.1.5** Understand the rules and order of calculation in a mathematical expression.
Performance Standards	a. Represent two steps mathematical problem by one mathematical sentence. b. Understand the necessity of order of calculation and be able to calculate appropriately. c. Apply commutative, associative and distributive rules to calculate mathematical problems. d. Use four operations to calculate mathematical expression in vertical form and recognise ways of using base 10 systems in vertical form.
Assessment Task	1. Use the order and rules of calculation appropriately in doing mathematics exercises.

Topic: **Introduction of Decimal Numbers**

Content Standard	**4.1.6** Understand the meaning of decimal numbers, add and subtract decimals up to one decimal place.
Performance Standards	a. Represent the quantity of the remaining part of a whole number or unit. and explain the meaning of decimal numbers with fraction of tenths. b. Represent fractions and decimals on a number line and compare the size. c. Through the changing of litre and decilitre, understand the relative size of numbers of decimal based on the difference of unit and one decimal place. d. Extend base ten systems into the decimal numbers to 1 decimal place. e. Compare the size of decimal numbers using number line. f. Use various ways of additions and subtraction of whole numbers to decimal numbers.
Assessment Tasks	1. Express decimal to fraction and vice versa. 2. Add and subtract decimal numbers to 1 decimal place. 3. Round of decimal number to nearest whole number.

Topic: **Decimal Numbers and their Calculations**

Content Standard	**4.1.7** Extend the understanding of structure of decimal numbers to represent decimal numbers up to two decimal places.
Performance Standards	a. Explain how to represent decimal numbers. b. Describe the structure of decimal numbers as an extension of base 10 place value system. c. Change and compare the denomination of the quantity for representing decimal numbers on the number line. d. Addition and subtraction of decimal numbers up to 2 decimal places in vertical form.
Assessment Tasks	1. Students write the place of a given decimal number as class exercise. 2. Students to solve problems comparing decimals to 2 decimal places. 3. Give students home work to put in ascending and descending order five decimals. 4. Students complete for home work an exercise in adding and subtracting decimals to 2 decimal place. 5. Addition and subtraction in vertical form according to their correct decimal position.

Topic: **Multiplication and Division of Decimal Numbers**

Content Standard	**4.1.8** Extend learned multiplication and division to multiply and divide decimal numbers by whole number.
Performance Standards	a. Use tape diagram and table of decimal numbers and multiply by a whole number. b. Use a tape diagram and table to decimal numbers and divide by a whole number. c. Using tape diagram and table to solve problems involving division with remainders. d. Using tape diagram and table distinguish difference of situations for multiplication or division of decimal numbers.
Assessment Tasks	1. Multiply whole number by 1-2 decimal numbers such as 1.2 x 2, 1.26 x 3. 2. Divide whole number by 1-2 decimal numbers such as 5.7 ÷ 3. 3. Experience the task of dividing continuously such as 7.3 ÷ 5 until no remainder. 4. Distinguish difference of situations for multiplication or division on word problems using tape diagram and table.

Topic: **Fractions Larger than One**

Content Standard	**4.1.9** Extend the understanding of Addition and subtraction to add and subtract fractions larger than one with same denominator.
Performance Standards	a. Represent fractions larger than 1 using various representations by diagrams with quantity such as litre or metre. b. Represent the equivalent fractions on the number line fraction wall. c. Use various diagrams to add improper fraction with same denominators. d. Use various diagrams to subtract improper fraction with same denominators.
Assessment Tasks	1. Represent fraction such as proper fractions, improper fractions and mixed numbers on a number line. 2. Change mixed fraction into improper fraction and vice versa and arrange fractions in ascending and descending order. 3. Using a fraction number line find equivalent fractions. 4. Add and subtract mixed fraction with same denominators.

Topic: **Multiples and Divisors**

Content Standard	**4.1.10** Understand the properties of numbers and apply such properties to identify the component of numbers.
Performance Standards	a. Apply component of multiples and common multiple for finding the number pattern. b. Apply component divisors and common divisor for finding the number pattern. c. Explain the relationship between multiples and divisors, using the idea of prime numbers. d. Apply component of even numbers and odd numbers to find number patterns.
Assessment Tasks	1. Play clap number game and enjoy using the idea of common multiple. 2. Use 100 square to shade multiples to find patterns. 3. Use 100 square to find prime numbers. 4. Write odd and even numbers.

Strand 2 : Quantity and Measurement

Topic: **Units of Area**

Content Standard	**4.2.1** Understand the meaning of units of area and represent areas with numbers.
Performance Standards	a. Compare the area measurements through direct comparison and in direct comparison of shapes to understand the meaning of area. b. Explain standard units of Area using various situations and representations. c. Explore and determine which unit to use for a given area.
Assessment Tasks	1. Compare the size of various areas through direct comparison and indirect comparison. 2. Find the areas of rectangle and square using the formula for area. 3. Use various ways to find the area of a figure composed rectangle and square. 4. Compare areas of various places around the school by various size and unit of area.

Topic: **Area of Squares and Rectangles**

Content Standard	**4.2.2** Explore area of squares and rectangles such as centimeter square (cm^2), metre (m^2) and develop formulae to calculate area.
Performance Standards	a. Using the unit square, introduce the formula of area of rectangle and square (LxW). b. Find the area of squares and rectangles using the formula. c. Calculate area of figures composed of rectangles and squares and explain the formula.
Assessment	1. Find the areas of rectangle and square using the formula for area. 2. Use various ideas to find the area of a figure composed of rectangle and square

Content Standard	**4.2.3** Understand the units of larger area and represent the area with numbers.
Performance Standards	a. Explore and compare large areas and decide how to calculate the area. b. Find the area of large areas using the formula. c. Calculate the larger area by converting units to the same unit (cm^2 to m^2) or (m^2 to cm^2).
Assessment	1. Find the areas of large areas using the formula for area. 2. Find the area using conversion of units.

Topic: **Sizes of Angles**

Content Standard	**4.2.4** Explore and develop the understanding of measurement of angles, how to construct and measure angles.
Performance Standards	a. Identify and estimate the size of angles from given situations. b. Understand degree as a unit to express the sizes of angles. c. Using a protractor to measure angles and draw angles of given sizes. d. Measure the angles of triangle rulers and form various angles and calculate the angles.
Assessment	1. Use protractor to compare and name angles. 2. Identify right angles and straight lines from objects around them.

Strand 3 : Geometrical Figures

Topic: **Quadrilateral as Plane Figure**

Content Standard	**4.3.1** Investigate and understandproperties of various types of quadrilaterals using vertex, angles, sides, parallel lines, perpendicular lines and diagonals.
Performance Standards	a. Draw four lines by connecting 2 selected dots on the square dotted grid paper, and find various quadrilaterals. b. Define perpendicular lines and parallel lines, and use the properties to draw them. c. Name various quadrilaterals such as trapezoid, parallelogram, rhombus, rectangle and square based on their properties. d. Identify beautiful patterns in tessellation of quadrilaterals and appreciate the properties of quadrilateral.
Assessment Tasks	1. Using dotted grid paper draw various quadrilaterals. 2. Explore various ways of drawing perpendicular lines and parallel lines. 3. Form various quadrilaterals using perpendicular lines and parallel lines. 4. Enjoy creating beautiful tile patterns through tessellations using one piece of quadrilateral.

Topic: **Rectangular Prism and Cube**

Content Standard	**4.3.2** Investigate and understand characteristics of rectangular prism and cube in terms faces and edges and make models of them.
Performance Standards	a. Using common objects to group solid shapes define rectangular prism and cube with vertex, sides and face. b. Produce net from rectangular prism and cube. c. Explore the rectangular prism and cube by relationship amongst faces, segment and edges. d. Represent positions on plane and space.
Assessment Tasks	1. Group common objects into solid shapes using properties of component faces. 2. Through rotating the box draw nets of rectangular prism and cube. 3. Fold the nets to produce rectangular prism or cube. 4. Enjoy Sketching rectangular prism and cube using squared paper and compare each other and explaining it with properties such as parallel lines.

Strand 4 : Data and Mathematical Relations

Topic: **Quantities Which Change Together**

Content Standard	**4.4.1** Explore quantities changing together and explain the patterns by sum, difference, product, and quotient.
Performance Standards	a. Investigate the various situations where quantities change together and find patterns to develop a table of values. b. Represent the given pattern which involve s sum, difference, product, quotient of two given changing quantities on a table values and graphs. c. Use mathematical sentence with □ and ○ for representing relationship on the table for a given situation.
Assessment Tasks	1. Explain the change of two quantities in given situations. 2. Draw a table for a given situation to find rules and patterns on how quantities change by the same value. 3. Use mathematical sentence with ☐ and ◯, find the missing number for a given situation.

Topic: **Line Graphs**

Content Standard	**4.4.2** Extend learned knowledge on tables and graphs to represent data and read line graphs.
Performance Standards	a. Represent data on a bar graph. b. To compare with bar graph know the usefulness of line graph for knowing basis such as increase, decrease and no change. c. Explore better ways to draw line graphs.
Assessment Tasks	1. From below choose one pair from I, ii, and iii, and collect the data to draw line graph and report your findings. i. Your height depending on the grade in the school. ii. Number of students in your school per grade. iii. Number of population in the school, community, and province per year.

Topic: **Arrangement of Data**

Content Standard	**4.4.3** Explore how to draw and read multi variable data by two dimensional tables.
Performance Standards	a. Gathering, record and arrange data on a table showing two information at once. b. Make and read a table from the qualitative data. c. Identify and present two variable data from the two dimensional tables on graphs and posters and explain their findings.
Assessment Tasks	1. Select a topic to gather multi variable data and analyse into it two dimensional tables and make a poster to explain your findings to others.

Grade 5

Strand 1 : Number and Operation

Topic: **Addition and Subtraction of Fraction.**

Content Standard	**5.1.1** Apply the process of adding and subtracting fractions to add and subtract the fractions with different denominators.
Performance Standards	a. Use various processes to find lowest common multiple (LCM). b. Add proper fraction and mixed number with different denominator. c. Add and subtract proper fraction and mixed number with different denominator. d. Subtract proper fraction and mixed number with different denominator.
Assessment Tasks	1. Change improper fractions to mixed numbers. 2. Calculate and simplify addition and subtraction of fraction with different denominators.

Topic: **Multiplication and Division of Fractions by Whole Number**

Content Standard	**5.1.2** Extend learned multiplication and division to multiply and divide decimal numbers by whole number.
Performance Standards	a. Using table, tape diagram, area diagram and idea of quotient explain fractions. (*proper, improper, mixed fraction)* multiplied by whole number. b. Using table, tape diagram, area diagram and idea of quotient explain fractions. *(proper, improper, mixed fraction)* divided by whole number.
Assessment Tasks	1. On fraction of multiplication problem, students change fraction to the simple whole number for making decision on the situation in multiplication or division, and draw diagram using the simple whole number and try getting the answer based on the ideas. 2. On fraction of division problem, students change fraction to the simple whole number for making decision on the situation in multiplication or division, and draw diagram using the simple whole number and try getting the answer based on the ideas.

Topic: **Decimal numbers and Whole Numbers**

Content Standard	**5.1.3** Use base 10 system representation to compare and convert whole number to decimal numbers.
Performance Standards	a. Use block diagram and place value chart to represent decimal and whole numbers. b. Identify the number of places to move decimal points depend on the tenths or hundredths to the right such as 1/10 of 296 is 29.6 *(move d.p1 place to right).*
Assessment Tasks	1. Explain the relationship between 1456 metre and 1.456 metres. 2. Change whole numbers to decimal and vice versa.

Topic: **Multiplication and Division of Decimal Numbers**

Content Standard	**5.1.4** Apply the process of multiplication to multiply a decimal number by a decimal number and a whole number by a decimal number.
Performance Standards	a. Multiply whole number by decimal and decimal number by a decimal number in vertical form. b. Multiply decimal number by decimal number and whole number and decimal numbers using various representation. c. Apply the rules of commutative and associative and distributive to the decimal numbers.
Assessment Tasks	1. Use tape diagram, tables, rules of multiplication and area diagram to show the explain multiplication such as 1.2 x 2.4. 2. Multiply decimal number by decimal number or whole number in vertical form. 3. Using number cards 2, 3 5 6 7 8 develop decimal multiplication □.□×□.□ and find the largest product and explain it solution.

Content Standard	**5.1.5** Apply the process of division to divide a decimal number by decimal number and a whole number by a decimal number.
Performance Standards	a. Divide whole number by decimal. b. Divide decimal number by a decimal number in vertical form. c. Solve division problems using various forms of calculations.
Assessment Tasks	1. Use tape diagram, tables, rules of multiplication and area diagram to show the explain multiplication such as 15 ÷ 3. 2. Divide decimal number by decimal number or whole number in vertical form.

Topic: **Size and Equivalent Fractions**

Content Standard	**5.1.6** Extend the understanding of fractions and their calculations to compare the size of fraction.
Performance Standards	a. Use the fraction wall to understand size of equivalent fraction. b. Compare and calculate the size of fractions with same denominator. c. Change and calculate fraction with different denominators into equivalent fraction with the same denominator to solve problems. d. Calculate and explain the process used to simplify a fraction. e. Calculation using fraction and quotient and express it as a decimal, fraction and whole number.
Assessment Tasks	1. Solve problems of equivalent fractions. 2. Simplify fractions. 3. Express fractions as decimal numbers and whole numbers.

Topic: **Introduction to Percentage**

Content Standard	**5.1.7** Understand and calculate simple percentages, and express them as fractions and decimals.
Performance Standards	a. Define and Interpret precent as a part of a hundred. b. convert percentage as fractions and as decimals, and vice versa. c. Explain why they represent the same value; calculate a given precent of a whole number. d. Calculating percentage of a given quantity.
AAssessment Tasks	1. Changing decimal to percentage. 2. Appreciate finding decimal and precent equivalent for common fractions. 3. Get proficiency from calculating a given percentage of a whole number. 4. Enjoy calculating percentage of a given number.

Strand 2 : Quantities and Measurement

Topic: **Area of Triangle and Quadrilaterals**

Content Standard	**5.2.1** Develop the formula to calculate areas of parallelogram,triangle,trapezium,rhombus and understand their transformation.
Performance Standards	a. Explore ways to calculate the area of square and rectangle and develop their area formula. b. Use the formula for area to calculate the area of other quadrilaterals. c. Explore ways to calculate the area of triangles and develop their area formula. d. Using area formula to explains equal area transformation of triangles and quadrilaterals.
Assessment Tasks	1. Calculate area of Triangles. 2. Calculate area of Quadrilaterals. 3. Use paper to transform one shape to different shapes.

Topic: **Units of Volumes (cm^3 , m^3)**

Content Standard	**5.2.2** Understand the units of volume and develope the formula of volume and measure.
Performance Standards	a. Use cuboid to develop the measure of space, and the units of volume. b. Use 1cm^3 to make volumes of cm^3 and to understand the standard unit of volume. c. Draw different sizes of cuboid from standard units of volume. d. Use the standard unit of volume cm^3 to make boxes of volumes in units of cubic metres (cm^3). e. Find the formula of volume for 3 dimensional shapes.
Assessment Tasks	1. Let's makes a box of 200 cm^3. 2. Using sticks or strings make 1m^3 cube. 3. Using clear storage plastic containers estimate and measure the volumes of various shapes.

Topic: **Measurement Per Unit (mean)**

Content Standard	**5.2.3** Understand the meaning of mean and measurement per unit and apply it to solve problems.
Performance Standards	a. Define mean and explore how to find mean of quantity in various situations. b. Express the results of measurement with appropriate numerical value by utilizing mean. c. Use rule of calculating mean to find the mean f measured value. d. Compare situation in relation to measure per unity quantity.
Assessment Tasks	1. Calculate the mean of given values.

Strand 3 : Geometrical Figures

Topic: **Congruent triangles, quadrilaterals and polygons**

Content Standard	**5.3.1** Investigate and understand the properties of congruent triangles and quadrilaterals.
Performance Standards	a. Given the triangles and quadrilaterals, Find different properties of angles. b. Using given measurements draw congruent quadrilaterals and explain their properties. c. Using given measurements draw congruent triangle and explain their properties.
Assessment Tasks	1. Calculate 3 angles of triangles in various ways. 2. Enjoy using mathematical instruments such as ruler, compass and protractor to draw congruent triangles. 3. Choose any quadrilateral and tessellate with same quadrilateral.

Topic: **Regular Polygons**

Content Standard	**5.3.2** Investigate and construct regular polygons and identify the properties of angles.
Performance Standards	a. Investigate and make regular polygons using various representations (*e.g. paper folding).* b. Identify the number of sides and the size of their angles of regular polygons. c. Draw regular polygon according to their properties using various instruments.
Assessment Tasks	1. Use papers and compass to fold and make polygons and recognise various patterns.

Topic: **Diameter and Circumference of the Circle**

Content Standard	**5.3.3** Explore common properties of circles and develop formula of circumference, diameter and radius.
Performance Standards	a. Explore and identify the properties of a circle (diameter, radius and circumference) b. Apply the properties of circles to develop the formula of diameter, radius and circumference. c. Use *TT* = 3.14 and 22/7 to calculate Circumference. d. Using the given formulas find the circumference and diameter of circles.
Assessment Tasks	1. Explain the properties of a circle. 2. Draw circles and show on the circle the diameter, circumference and radius. 3. Using the given formula find the diameter and circumference of circles.

Topic: **Solids and their Properties**

Content Standard	**5.3.4** Investigate and identify the properties of solids (Prisms and cylinders).
Performance Standards	a. Explore and identify the different solids and their properties. b. Identify the characteristics and properties of prism and cylinders. c. Sketch and draw nets of prisms and cylinders.
Assessment Tasks	1. Describe the properties of a given prism. 2. Complete a table with solids and their properties . 3. Draw the nets of given solids.

Strand 4 : Data and Mathematical Relations

Topic: **Proportion (Two changing quantities)**

Content Standard	**5.4.1** Explore proportions in two changing quantities patterns and explain the patterns by using the relation of direct proportionality.
Performance Standards	a. Use various situations where two changing quantities are directly proportional and develop tables for knowing patterns. b. Use various situations where two changing quantities are directly proportional and represent it on tables and graphs. c. Use mathematical sentence with □ and ○, find a missing number for a given situation.
Assessment Tasks	1. Explain proportions in two changing quantities in a given situation. 2. Draw a table for a given situation to find patterns on how two changing quantities correspond. 3. Use mathematical sentence with □ and○, find the missing number for a situation.

Topic: **Using Ratio for Comparison**

Content Standard	**5.4.2** Extend their understanding of data and statistics to construct graphs using given scales and quantities.
Performance Standards	a. Collect, organise and represent data using bar graphs, and simple pie charts. b. Use data as a source for representation, interpretation and setting problems. c. Identify ordered pairs of data from a graph and interpret the meaning of the data in terms of the situation depicted by the graph.
Assessment Task	1. Develop questions and make comparisons based on the given information.

Topic: Percentage of Data

Content Standard	**5.4.3** Use percentage and compare data sets of different sizes.
Performance Standards	a. Represent percentage by setting the size of the base quantity at 100. b. Use fractions and percentage to compare data sets of different sizes. c. Calculate and represent percentage in tables and graphs.
Assessment Tasks	1. Find Percentage of different size of data. 2. Compare and answer question on data set different sizes use as fraction and percentages.

Assessment and Reporting

The term assessment is defined as the ongoing monitoring and evaluation process of teaching and learning performance of the intended curriculum. The assessment set and conducted must be aligned to the teaching and learning activities and the set standards.The weaknesses identified through assessment tasks can be addressed to improve teaching and learning.

Assessment in Mathematics should first and foremost be used to evaluate students 'performance so that teaching can be adjusted to improve students 'achievements of the content standards thus, Assessment must be continuous throughout the year.

Types of Assessments

Standards Based Curriculum promotes the following assessment types:

- Benchmark Assessment
- Formative Assessment
- Summative Assessment

Formative Assessment

Assessment *for* Learning

Assessment ***for*** learning also known as classroom assessment. It is an ongoing process and interaction between teaching and learning. It is used to help learners improve their performance, skills or understand the tasks better. It also helps both students and teachers to see:

- the learning standards and criteria
- where each learner's performance in relation to the goals or content standards
- where they need improvement
- and how to improve.

Assessment *as* Learning

Assessment ***as*** learning is the use of a task or an activity to allow students the opportunity to use assessment to further their own learning. Self and peer assessments allow students to reflect on their own learning and identify areas of strength and weakness. These tasks offer students the chance to set their own personal goals and advocate for their own learning.

Summative Assessment

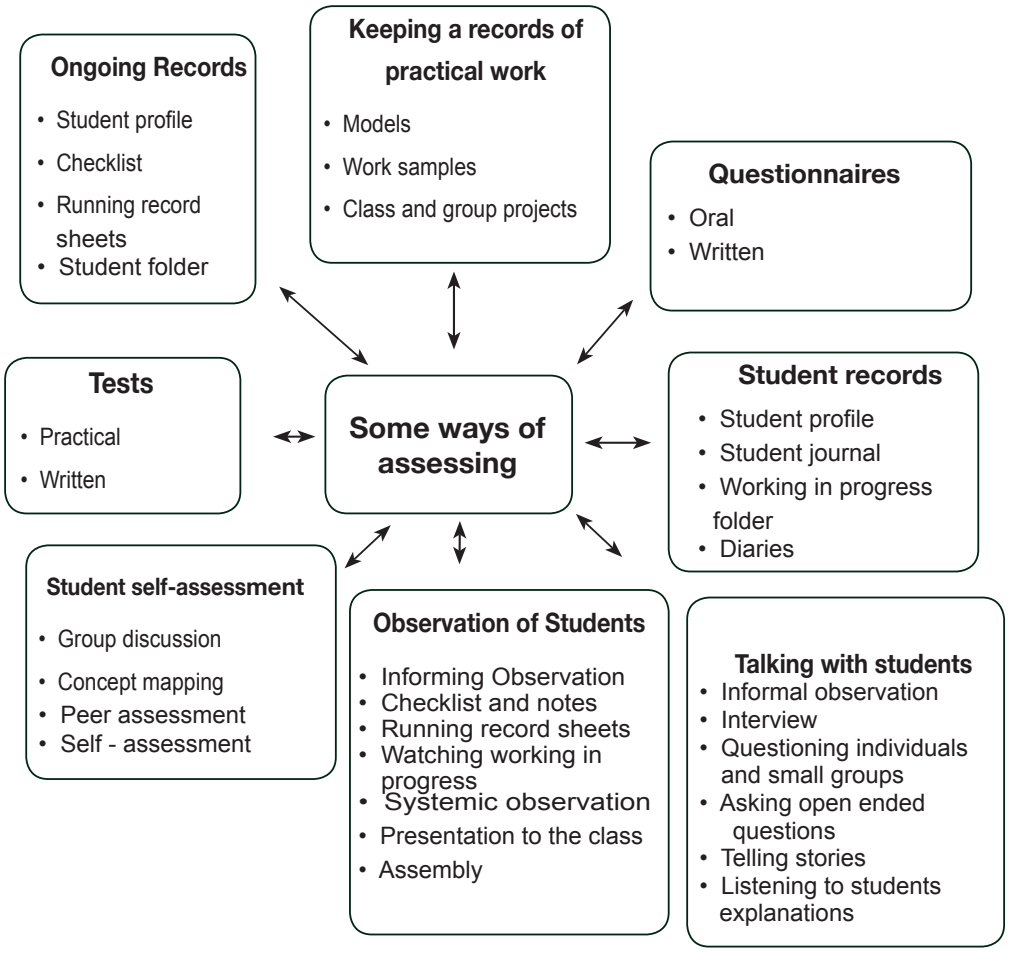
Assessment *of* Learning

Assessment ***of*** learning is the use of a task or an activity to measure, record and report on a student's level of achievement in regards to specific learning expectations. These are often known as summative assessments.

Written tests should not be the only methods used to evaluate students' performance. Other assessment methods must also be used.

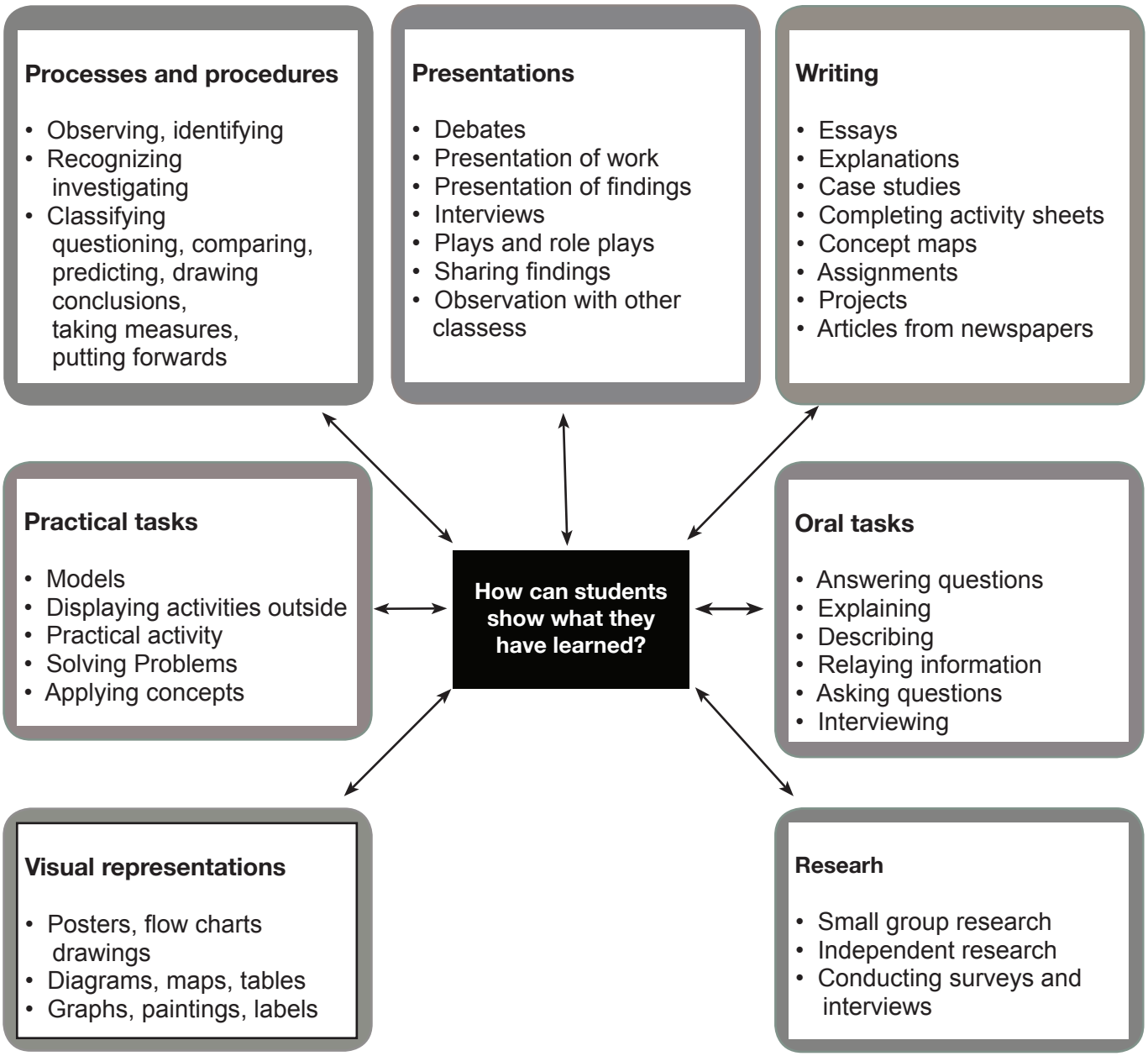
Assessment Methods

Assessment is an integral part of students learning and can be done using different methods. Below are some of these methods**.**



Recording, Reporting and Evaluating

Assessment is an integral part of students learning and can be demonstrated in many ways. Below are some of these ways.



Evaluation

Teachers will use assessment information to make judgments about the effectiveness of their teaching, learning and assessment programs and to enhance their teaching practice in order to improve student learning.

Schools may use whole school assessment data to evaluate the effectiveness of teaching and learning in a particular subject or at particular grade levels and make decisions on how to improve student learning.

Glossary

Words	Definitions
Arbitrary Unit	Is a unit which is not part of an internationally accepted absolute system of units.
Augend	A number to which another number is added to form a sum
Assessment	Activities teachers use to help students learn and to monitor their progress.
Assessment As/In Learning	Is a design to inform students what they will do well and what they need to improve on daily/weekly bases as an integral part of everyday teaching and learning such as exercise, activities or experiments students do or practice in each lesson
Assessment For Learning	A common form of assessment. It is an ongoing process that arises out of the interaction between teaching and learning. Also referred to as formative assessment.
Assessment Of Learning	Provides a summary of students learning over a set period of time and is generally carried out at the end of a course or project. Sometimes it is referred to as summative assessment and are evaluative.
Assessment Of Learning	Provides a summary of students learning over a set period of time and is generally carried out at the end of a course or project. Sometimes it is referred to as summative assessment and are evaluative.
Assessment Tasks	On-going test of knowledge, skills and attitudes/values gained throughout the particular unit or topic.
Assessment Strategies	Different styles and ways of assessing students work
Bar graphs	A diagram in which the numerical values of variables are represented by the height or length of lines or rectangles of equal width.
Benchmark	A benchmark is a required standard or yardstick in which something is measured against. In the national curriculum, it is set to evaluate and validate the standard of curriculum as well as the effectiveness of teaching and learning at the end of each level of schooling. In PNG, Benchmarking is referred to as assessment of content standards at the end of each level of schooling such as Elementary 2, Grade 5 and Grade 8.
Cardinals	Number denoting quantities e.g. 1, 2, 3, etc.
Centre	A point which all points on the circle or sphere are the same distance
Circumference	The enclosing boundary of a circle
Diameter	A straight line passing side to side through the centre of a figure especially circle and sphere
Difference	The result of subtracting one number from the other
Dividend	The number being divided
Divisor	A number that divides an integer evenly or a factor that will divide the dividend exactly
Equilateral triangle	A triangle in which all three sides are equal. It is also equiangular; all three interior angles are equal and measure 60°
Expression	A mathematical phrase that can contain ordinary numbers, variables (like x or y) and operations (like)
Content Standard	A broad statement of what students need to know, understand, and be able to do as intended by the syllabus. They define the breadth and depth of knowledge, skills and processes and attitudes and values that are to be taught in the strand, unit or topic.

Words	Definitions
Fraction	A numerical quantity that is not a whole number e.g. , the top number is the numerator and the bottom number is the denominator
Horizontal axis	The line on a graph that runs horizontally (left-right) through zero. It is used as a reference line so you can measure from it; the x-axis.
In-equality	Two values are not equal and the symbols include (- not equal to, <less than, >greater than, - less than or equal to or - greater than or equal to)
Isosceles triangle	A triangle that has two sides of equal length
Length	The measurement or extent of something from end to end
Minuend	The first number in a subtraction, the number from which another number is to be subtracted
Multiplicand	A number that is to be multiplied by another
Multiplier	A number by which another number is multiplied
Ordinals	Number defining the position of something in a series e.g. first, second, third, etc.
Partitive Division	A division problem where you know the total number of groups, and you are trying to find the number of items in each group
Performance Standards	A descriptive statement of the knowledge and skills that students may display as they work towards the achievement of the content standard. The performance standards are examples only. Performance standards make content standards operational.
Product	The answer when two or more numbers are multiplied
Quotative Division	Involves taking a set of size 'a' and forming groups of size 'b'. The number of groups of this size that can be formed, 'c' is the quotient of 'a' and 'b'
Quotient	The quantity produced by division of two numbers
Radius	A straight line from the centre to the circumference of a circle or sphere, of the diameter
Remainder	The amount "left over" after performing some computation. Normally an integer "left over" after dividing one integer by another to produce and integer quotient
Standard	A standard is a level of quality or achievement, especially a level that is thought to be acceptable. It is something used to measure or estimate the quality or degree of something, for example, how good a piece of work is.
Standards Based Education Assessment	Is a learning system and is a systematic and ongoing process of collecting and interpreting information about students achievements
Sphere	A round solid figure with every point on its surface equidistant from its centre e.g. soccer ball
Subtrahend	The number that is to be subtracted
Sum	The result of adding two or more numbers
Vertex	A corner or a point where lines meet
Vertical axis	The line on a graph that runs vertically (up-down) through zero. It is used as a reference line so you can measure from it, the y-axis.
Weight	A body's relative mass or the quantity of matter contained by it, giving rise to a down-ward force. The heaviness of a person or thing

References

NDOE 2004, *Mathematics Lower Primary Syllabus,* NDOE, Waigani

NDOE 2004, *Mathematics Lower Primary Teacher Guide,* NDOE, Waigani

NDOE 2004, *Elementary Cultural Mathematics Syllabus,* NDOE, Waigani

Elementary School Teaching Guide for the Japanese Course of Study (grade 1-6), 2010, CRICED, University of Tsukuba

Study with your Friends Mathematics for Elementary School, © Gakkohtosho Co. LTD, Taheshi Nara, Tosho Printing Co., LTD Japan

NDOE 2002, *Assessment and Reporting Policy, 2003* NDOE Waigani

NDOE 2002, *National Curriculum Statement*, Papua New Guinea NDOE, Waigani

NDOE 1986, *A Philosophy of Education* for Papua New Guinea, Ministerial Committee Report (P. Matane, chair), NDOE, Waigani

NDOE 2013*, Report of the Task Force for the Review of Outcomes Based Education (OBE)* in Papua New Guinea

‘FREE ISSUE - NOT FOR SALE’