

# Introduction

This syllabus explains the knowledge, skills, attitudes and values that students should achieve in Elementary Prep, 1 and 2 in Cultural Mathematics. These are expressed as learning outcomes and indicators.

The learning outcomes are student-centred and written in terms that enable them to be demonstrated, assessed or measured. The outcomes are written to show the progression from one grade to the next.

Each learning outcome is illustrated with a list of examples of the kinds of things students should be able to do, know and understand if they are achieving an outcome. These are called indicators.

The learning outcomes and indicators will:

- give teachers individually or in groups, the flexibility to write programs and units of work, which should be developed to suit local conditions and individual student needs
- help teachers assess and report on students' achievements in relation to the learning outcomes
- allow student achievement of the outcomes to be described in consistent ways
- help teachers monitor students' learning
- help teachers plan their future teaching programs.

In Cultural Mathematics, a manageable number of outcomes are identified for each grade in Elementary Prep, 1 and 2. They are:

- organised to show progression from one grade to the next
- organised into strands which contain a family of separate outcomes that are related to a particular theme: Space, Measurement, Number, Pattern, Chance
- numbered to help track similar outcomes linked to the strands from one grade to the next
- written to include all the essential knowledge, skills and understandings a student should achieve in the Cultural Mathematics course
- created using an active verb to ensure students actively participate in the learning.

The language of instruction at Elementary is the students' vernacular, which will enable teachers to enhance the students' understanding of mathematical concepts.

Students need to use mathematics in different contexts. Teachers teaching this course must be competent in the language the children speak, so that they can explain the mathematical concepts clearly to their students.

Cultural Mathematics is to be timetabled for 180 minutes per week in all Elementary schools.

## **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, skills and understanding. The mathematics described in this syllabus provides a foundation for this.

Students at Elementary will be able to link new mathematical concepts from the five strands in this syllabus to their existing cultural knowledge. The students will integrate this knowledge so that they are can confidently use mathematics in their everyday lives. The Elementary Cultural Mathematics course provides many opportunities for relevant and purposeful learning in an environment that is built on the principles of home life.

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# Curriculum principles

## Our way of life

This course is based on three learning principles:

- we learn best when we build new learning on what is already known
- we learn well when we recognise an immediate use or need for what is to be learned
- we use ideas and skills in a coordinated way to solve real problems.

The syllabus continually refers to pre-existing knowledge and skills and teachers need to set the mathematics into contexts that are familiar and of interest to the students. The students need to use concepts and skills from many areas of mathematics to come up with solutions to problems in real-life situations.

## Integral human development

### Catering for diversity

The Cultural Mathematics curriculum must offer students equal opportunities to participate in class activities and assessment activities. These must be directed and be suitable for girls and boys. To meet the requirements of our National Constitution teachers must ensure that there is no bias in their teaching, learning and assessment methods. All students must be given equal opportunity to achieve success.

## Teaching and learning

In Elementary schools, teachers use an integrated approach to teaching and learning. The teacher creates a program that is meaningful, appropriate and motivating for the students. The use of learning outcomes provides opportunities to integrate the curriculum.

Teachers should map out the learning outcomes for those parts of the syllabus that they are intending to teach in the coming term or year. Where there is more than one teacher across a grade, this should be done as a small team.

Teachers with leadership responsibilities in the school should be invited to attend and support this planning process. While carrying out this process, links between learning outcomes for different subjects should be noted, as there is scope for combining and using these outcomes in an integrated approach to teaching and learning.

For example, a Language learning outcome might refer to the use of questionnaires and holding discussions with community members and a Culture and Community learning outcome may also do this. In this way evidence of the achievement of these outcomes can be provided in more than one subject.

The education of a child in the past was the responsibility of the family and the local community. Traditional education was integrated with events and seasons and extended over many years depending on the student's needs. An individual learned about the spiritual, social, economical and political skills necessary for life in the community. These practices have become the foundation of learning for Elementary students.

Teaching should build on what students know and should use appropriate local contexts and the community to promote better understanding.

Elementary education aims to help students to continue developing an understanding of and identification with their local cultural values and beliefs using the language they already speak.

### **Student-centred learning**

The teaching approaches required for this syllabus are student-centred. They should promote the philosophy of how to think. Student-centred teaching activities include investigation, problem solving and out-of-class excursions. These approaches provide opportunities for students to work cooperatively, discuss, make decisions, plan, organise, carry out activities, record results and report findings. Teaching activities should also allow students to listen to each other's opinions, demonstrate their strategies and critically analyse results.

### **Thematic teaching and integration**

Traditional education was integrated and taught young people to see the world through the eyes of the community, focusing on their needs. Elementary teaching focuses on an integrated curriculum, which is organised into the following subjects: Culture and Community, Language and Cultural Mathematics.

A thematic, student-centred, activity-based approach is recommended in Elementary classes. Teaching and learning activities should be based on community themes as much as possible, derived from the community's calendar and be sensitive to the local culture, traditions and seasons. The development of skills should be emphasised. Cultural Mathematics will be developed with advice from the community.

**Flexibility and relevance**

It is important to establish a routine for students. However, teachers need to be flexible with the times allocated to allow for spontaneous learning experiences.

Special projects, field trips and unplanned events such as deaths and births and natural disasters such as a volcanic eruption, often provide opportunities for integrated, holistic learning.

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

## **Aims**

Students develop:

- a sound foundation for further mathematical learning
- confidence in applying mathematical skills
- curiosity leading to the understanding of concepts
- determination to persist with difficult problems
- critical judgment in selecting approaches to problems
- an appreciation of the cultural diversity in numeracy.

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## Content overview

The content of this syllabus is organised into five strands. A strand such as Space is a useful and convenient way of organising the learning outcomes for a subject.

Each strand identifies particular aspects of a subject or a theme such as a set of processes. Each strand displays a typical progression of learning from one grade to the next.

Each strand is further organised into a number of substrands to allow the content to be specified and described as learning outcomes.

Cultural Mathematics is organised into five strands:

- Space
- Measurement
- Number
- Pattern
- Chance.

Space has two substrands:

- Space
- Shape.

Measurement has three substrands:

- Measuring and estimating
- Area
- Time.

Number has four substrands:

- Counting
- Mathematical language
- Operations
- Money.

Pattern has one substrand:

- Patterns.

Chance has one substrand:

- Chance and information.

### Space

This strand deals with giving information and directions to be followed to move from location to location. It also deals with the concept of shape and the language required to describe various shapes.

### Measurement

This strand concentrates on the units used to describe length, weight, capacity, area and time and how they are measured.

The concepts in this strand focus on ways of measuring using local measurements as well as common formal measurements.

Students will also estimate and calculate time using traditional ways.

## **Number**

This strand deals with local counting systems using the students' own language as well as learning the formal language words used in mathematics.

The concepts of the four operations, addition, subtraction, multiplication and division are dealt with in a practical way. The value of different traditional money is compared with today's money of Papua New Guinea.

## **Pattern**

This strand deals with number patterns and local art patterns such as those used for bilums and pottery.

Students are introduced to simple number patterns and their representations as they use numbers to write and to form patterns.

The patterns of the local community are found in such things as headdresses for dances and body decoration. Patterns such as tattoos are identified and students learn how to apply rules or make their own rules to produce these patterns.

## **Chance**

This strand deals with students using information to predict or make guesses about events that will happen, may happen or can never happen.

They use simple activities to learn how to explore the concept in this strand.

## **Table of strands and substrands**

<b>Strand</b>	<b>Elementary Prep</b>	<b>Elementary 1</b>	<b>Elementary 2</b>
<b>Space</b>	<ul style="list-style-type: none"> <li>• Space</li> <li>• Shape</li> </ul>	<ul style="list-style-type: none"> <li>• Space</li> <li>• Shape</li> </ul>	<ul style="list-style-type: none"> <li>• Space</li> <li>• Shape</li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>• Measuring and estimating</li> <li>• Area</li> <li>• Time</li> </ul>	<ul style="list-style-type: none"> <li>• Measuring and estimating</li> <li>• Area</li> <li>• Time</li> </ul>	<ul style="list-style-type: none"> <li>• Measuring and estimating</li> <li>• Area</li> <li>• Time</li> </ul>
<b>Number</b>	<ul style="list-style-type: none"> <li>• Money</li> <li>• Counting</li> <li>• Mathematical language</li> <li>• Operations</li> </ul>	<ul style="list-style-type: none"> <li>• Money</li> <li>• Counting</li> <li>• Mathematical language</li> <li>• Operations</li> </ul>	<ul style="list-style-type: none"> <li>• Money</li> <li>• Counting</li> <li>• Mathematical language</li> <li>• Operations</li> </ul>
<b>Pattern</b>	<ul style="list-style-type: none"> <li>• Patterns</li> </ul>	<ul style="list-style-type: none"> <li>• Patterns</li> </ul>	<ul style="list-style-type: none"> <li>• Patterns</li> </ul>
<b>Chance</b>	<ul style="list-style-type: none"> <li>• Chance and information</li> </ul>	<ul style="list-style-type: none"> <li>• Chance and information</li> </ul>	<ul style="list-style-type: none"> <li>• Chance and information</li> </ul>



# Learning outcomes

## Numbering of learning outcomes

Each learning outcome is numbered with three digits, such as 1.1.1. The first number refers to the grade level. The second number refers to the strand. The third number refers to the outcome in the strand. Thus, 1.1.1 refers to an outcome at Elementary 1, strand 1 and outcome number 1.

Strand	Elementary Prep	Elementary 1	Elementary 2
<b>Space</b>	<b>P.1.1</b> Follow and give simple directions for moving in a space	<b>1.1.1</b> Follow and give directions to move from place to place	<b>2.1.1</b> Follow directions from simple maps
	<b>P.1.2</b> Identify locally known shapes by their visual appearance	<b>1.1.2</b> Compare and group shapes in the community	<b>2.1.2</b> Investigate and describe the features of geometric shapes
<b>Measurement</b>	<b>P.2.1</b> Measure the length, weight and capacity of things using their own informal measuring units	<b>1.2.1</b> Measure, and compare the length, weight and capacity of things using local informal units	<b>2.2.1</b> Compare the accuracy of local measures of length, weight and capacity
	<b>P.2.2</b> Measure how much space is covered by objects using their own informal units	<b>1.2.2</b> Compare and measure an area using local ways of measuring	<b>2.2.2</b> Estimate the number of objects needed to cover a surface
	<b>P.2.3</b> Use time markers	<b>1.2.3</b> Tell and use time in traditional ways	<b>2.2.3</b> Identify and sequence events that occur at different times
<b>Number</b>	<b>P.3.1</b> Count objects in vernacular using local number systems	<b>1.3.1</b> Count groups of objects in vernacular	<b>2.3.1</b> Count objects in vernacular and English using local and standard number systems
	<b>P.3.2</b> Describe the four operations using simple vernacular words	<b>1.3.2</b> Use number symbols that mean the same as vernacular number words	<b>2.3.2</b> Use vernacular and English words for number symbols and operational signs
	<b>P.3.3</b> Solve simple problems using concrete materials	<b>1.3.3</b> Solve problems using two-digit numbers to 20 or closest to 20 in vernacular	<b>2.3.3</b> Solve problems using two-digit numbers up to 99
	<b>P.3.4</b> Describe traditional money and Papua New Guinean money	<b>1.3.4</b> Use different amounts of money to make up various sums of money	<b>2.3.4</b> Make and solve money problems

<b>Strand</b>	<b>Elementary Prep</b>	<b>Elementary 1</b>	<b>Elementary 2</b>
<b>Patterns</b>	<b>P.4.1</b> Make simple patterns	<b>1.4.1</b> Recognise various local patterns	<b>2.4.1</b> Collect and compare various patterns
<b>Chance</b>	<b>P.5.1</b> Identify events that always happen regularly in the community	<b>1.5.1</b> Identify and describe events that sometimes happen in the community and the environment	<b>2.5.1</b> Make guesses about events that will happen, may happen or will never happen

# Learning outcomes and indicators

## Strand: Space

Substrand	Elementary Prep	Elementary 1	Elementary 2
<b>Space</b>	<b>P.1.1</b> Follow and give simple directions for moving in a space	<b>1.1.1</b> Follow and give directions to move from place to place	<b>2.1.1</b> Follow directions from simple maps
<b>Indicators</b>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• give simple directions such as walk three steps forward, stop, take three steps left, turn right, take three steps backward</li> <li>• demonstrate using directions given</li> <li>• make a list of local names for directions such as east (sun rises)</li> <li>• use direction words to play games</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• give directions to a person to find a place in the community</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• talk about direction names in vernacular such as east (sun rises), west (sun sets), north and south</li> <li>• draw simple maps to show directions to find the school, villages, gardens, church</li> <li>• make a list of directions to guide people to certain places</li> </ul>

## Strand: Space

Substrand	Elementary Prep	Elementary 1	Elementary 2
<b>Shape</b>	<b>P.1.2</b> Identify locally known shapes by their visual appearance	<b>1.1.2</b> Compare and group shapes in the community	<b>2.1.2</b> Investigate and describe the features of geometric shapes
<b>Indicators</b>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• collect and display locally known shapes in everyday life</li> <li>• name and label locally known shapes in vernacular</li> <li>• make a mobile of locally known shapes</li> <li>• make a collage of locally known shapes</li> <li>• sort and match shapes</li> <li>• make models of locally known shapes using sand, clay or mud</li> <li>• identify lines found in the local environment such as roads, rivers, drawings</li> <li>• draw line drawings of things such as gardens, houses, playing fields</li> <li>• find things in the local community where one half looks exactly the same as the other half</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• sort shapes according to their differences and similarities</li> <li>• make new shapes by putting simple shapes together</li> <li>• display groups of different shapes from the community such as baskets, pots, kundus, shells</li> <li>• name features of shapes in vernacular such as edges, angles, curves, corners</li> <li>• group local shapes according to their features such as all objects with curved edges</li> <li>• build objects using local materials and label the shapes used</li> <li>• make line drawings of regular and irregular shapes found in the community</li> <li>• draw objects from different places that are symmetrical</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• talk about the features of shapes such as edges, angles, curves, faces, sides, corners</li> <li>• group shapes according to number of sides, shapes, angles</li> <li>• count faces, corners and edges of geometrical figures</li> <li>• build new shapes using three-dimensional shapes</li> <li>• label using vernacular and say English words for features such as corners, edges, angles</li> <li>• identify and discuss types of lines that make up objects such as long, straight, sharp, curved, wavy, thick, thin</li> <li>• group lines according to their differences and similarities</li> <li>• make symmetrical shapes such as butterfly wings, leaves, flower petals</li> </ul>

**Strand: Measurement**

Substrand	Elementary Prep	Elementary 1	Elementary 2
<p><b>Measuring and estimating</b></p>	<p><b>P.2.1</b> Measure the length, weight and capacity of things using their own informal measuring units</p>	<p><b>1.2.1</b> Measure, and compare the length, weight and capacity of things using local informal units</p>	<p><b>2.2.1</b> Compare the accuracy of local measures of length, weight and capacity</p>
<p><b>Indicators</b></p>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• match and compare lengths and heights using their own units</li> <li>• measure length, width and height using their own units such as bottle tops, seeds, leaves</li> <li>• collect items of different weight and arrange them in order using their own units</li> <li>• match and compare light and heavy objects</li> <li>• arrange light and heavy objects in a simple order</li> <li>• collect containers of different sizes and arrange them in order</li> <li>• use traditional ways to guess and order the amount of liquid such as water, juice</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• use things such as hand span, arm lengths, pacing, sticks or other items to measure length</li> <li>• use comparison words for measuring such as light, lighter, lightest, heavy, heavier, heaviest, long, short, tall, full, empty, not much</li> <li>• use different containers and other items to measure capacity</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• measure lengths in different ways and compare their accuracy</li> <li>• talk about and practise some traditional measures from their local community</li> <li>• compare local ways of measuring weight</li> <li>• measure capacity using various common containers</li> </ul>

**Strand: Measurement**

<b>Substrand</b>	<b>Elementary Prep</b>	<b>Elementary 1</b>	<b>Elementary 2</b>
<b>Area</b>	<b>P.2.2</b> Measure how much space is covered by objects using their own informal units	<b>1.2.2</b> Compare and measure an area using local ways of measuring	<b>2.2.2</b> Estimate the number of objects needed to cover a surface
<b>Indicators</b>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• use items such as leaves, bottle tops, stones or pattern blocks to cover surfaces such as table top, books</li> <li>• find out how much space is taken up by such things as gardens, houses, pathways, roads, classrooms</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• use informal units to measure regular surfaces such as leaves, mats</li> <li>• measure and compare areas using traditional ways of measuring</li> <li>• arrange in order things such as school gardens, school classrooms, teachers' houses, tables</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• estimate how many objects it takes to cover irregular surfaces</li> <li>• use different objects to estimate the area of a given space</li> </ul>

**Strand: Measurement**

Substrand	Elementary Prep	Elementary 1	Elementary 2
<b>Time</b>	<b>P.2.3</b> Use time markers	<b>1.2.3</b> Tell and use time in traditional ways	<b>2.2.3</b> Identify and sequence events that occur at different times
<b>Indicators</b>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• name parts of the day using traditional measures of time in vernacular</li> <li>• talk about some annual events and celebrations such as harvest time, Easter, Independence Day, Christmas Day</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• name and list different parts of the day, days of the week, months of the year</li> <li>• list important events of the year such as feasts, celebrations</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• discuss their traditional calendar</li> <li>• list the seasons and activities for each season</li> <li>• make a community calendar</li> </ul>

**STRAND: Number**

<b>Substrand</b>	<b>Elementary Prep</b>	<b>Elementary 1</b>	<b>Elementary 2</b>
<b>Counting</b>	<b>P.3.1</b> Count objects in vernacular using local number systems	<b>1.3.1</b> Count groups of objects in vernacular	<b>2.3.1</b> Count objects in vernacular and English using local and standard number systems
<b>Indicators</b>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• name numbers from zero to the highest number that is possible in vernacular</li> <li>• count common objects by their own number words</li> <li>• count using concrete objects</li> <li>• talk about where numbers are used in their lives</li> <li>• match local number words to the same number of objects</li> <li>• count local money</li> <li>• talk about some of the symbols, pictures or objects used to represent numbers</li> <li>• use numbers to participate in traditional games such as finding hidden objects</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• count by grouping objects in many different ways such as in twos, fives and tens</li> <li>• identify how objects such as fish, taro, kaukau, banana, peanuts, betelnuts are grouped in the community</li> <li>• count groups of objects to the highest two-digit number possible such as count in twos to 98</li> <li>• say and write number words up to the highest two-digit number possible</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• count numbers from one to a hundred in English using the international number system</li> <li>• read and write number words in vernacular up to 100</li> <li>• count to a hundred in groups of twos, fives and tens in vernacular and English</li> <li>• count numbers accurately in games such as card games, board games and playground activities</li> <li>• write locally used position numbers (ordinal numbers) from first to tenth or as far as the language can go and say them in English</li> </ul>



**Strand: Number**

Substrand	Elementary Prep	Elementary 1	Elementary 2
<p><b>Mathematical language</b></p>	<p><b>P.3.2</b> Describe the four operations using simple vernacular words</p>	<p><b>1.3.2</b> Use number symbols that mean the same as vernacular number words</p>	<p><b>2.3.2</b> Use vernacular and English words for number symbols and operational signs</p>
<p><b>Indicators</b></p>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• talk about vernacular words for each of the operations such as words that mean putting together, taking away, grouping and sharing</li> <li>• use vernacular words for operations when solving problems</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• identify and draw number symbols from zero to the highest possible number in vernacular</li> <li>• match vernacular words with number symbols by playing simple card games</li> <li>• make a set of posters to match number words, symbols and pictures</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• draw number symbols (numerals) from zero to a hundred</li> <li>• say English and vernacular words for number symbols</li> <li>• identify and draw signs for addition, subtraction, multiplication and division</li> <li>• make mobiles matching numbers, words and pictures</li> </ul>

**Strand: Number**

Substrand	Elementary Prep	Elementary 1	Elementary 2
<p><b>Operations</b></p> <p><b>Indicators</b></p>	<p><b>P.3.3</b> Solve simple problems using concrete materials</p> <p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• share whole objects using concrete materials amongst friends</li> <li>• talk together in pairs or small groups to work out ways of solving simple problems</li> <li>• put together objects, such as counters or stones, to see how many objects there are altogether</li> <li>• apply counting skills to work out how many objects, such as pencils, seeds or marbles, there are altogether in a number of containers</li> <li>• use counters, such as stones, leaves, seeds, to decide how many objects are left after some are given away</li> <li>• arrange concrete materials in simple games or activities to show understanding of all four operations</li> </ul>	<p><b>1.3.3</b> Solve problems using two-digit numbers to 20 or closest to 20 in vernacular</p> <p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• identify and write units and tens</li> <li>• work out simple addition and subtraction problems with no trading</li> <li>• represent a problem using concrete materials and say it in vernacular words</li> <li>• share objects such as marbles, bottle tops, sweets, peanuts or fruit equally amongst friends</li> <li>• group objects into lots, such as two lots, three lots, four lots to find the product</li> <li>• identify and share a whole object into equal parts such as into two parts, four parts</li> </ul>	<p><b>2.3.3</b> Solve problems using two-digit numbers up to 99</p> <p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• place and write numbers in units and tenths using number sentences and place value tables</li> <li>• work out simple addition and subtraction problems with trading</li> <li>• make simple number sentences using numerals, vernacular and English words</li> <li>• use concrete materials to make up number sentences to describe groups of objects such as two groups of five betelnuts</li> <li>• solve simple multiplication and division problems using concrete materials without trading</li> <li>• identify and share a whole object into equal parts such as into three parts, five parts</li> </ul>

**Strand: Number**

Substrand	Elementary Prep	Elementary 1	Elementary 2
<b>Money</b>	<b>P.3.4</b> Describe traditional money and Papua New Guinean money	<b>1.3.4</b> Use different amounts of money to make up various sums of money	<b>2.3.4</b> Make and solve money problems
<b>Indicators</b>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• talk about traditional money with community members and explain its value</li> <li>• recognise Papua New Guinean money and traditional currency</li> <li>• use different coins to make up K1.00</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• show different notes and coins used</li> <li>• calculate their change from a given amount after shopping or marketing</li> <li>• make up given amounts of money</li> <li>• play 'shop' with change to K10.00</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• calculate the cost of what they intend to buy</li> <li>• calculate the remaining amount after their spending</li> </ul>

**Strand: Patterns**

Substrand	Elementary Prep	Elementary 1	Elementary 2
<b>Patterns</b>	<p><b>P.4.1</b> Make simple patterns</p>	<p><b>1.4.1</b> Recognise various local patterns</p>	<p><b>2.4.1</b> Collect and compare various patterns</p>
<b>Indicators</b>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• use numbers to count simple patterns</li> <li>• recognise, memorise and use simple patterns</li> <li>• make an object such as a necklace, a drawing using repeating patterns</li> <li>• identify repeating patterns of colours in objects such as bilums, tapa cloth, clay pots, lime pots, mats</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• talk about different patterns of local community activities such as headdresses for dances, tattoo patterns, flower patterns</li> <li>• observe an item from plants or animals, such as finding out if there are patterns in any of them or in the way they are made up</li> <li>• use common colours to make patterns</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• apply rules to create their own patterns</li> <li>• identify rules in different patterns</li> <li>• find the missing items in a simple pattern</li> <li>• make own rules and apply them in forming patterns</li> <li>• solve simple number patterns, such as two, four, six</li> </ul>

**Strand: Chance**

Substrand	Elementary Prep	Elementary 1	Elementary 2
<p><b>Chance and information</b></p>	<p><b>P.5.1</b> Identify events that always happen regularly in the community</p>	<p><b>1.5.1</b> Identify and describe events that sometimes happen in the community and the environment</p>	<p><b>2.5.1</b> Make guesses about events that will happen, may happen or will never happen</p>
<p><b>Indicators</b></p>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• identify daily routines such as getting up, going to bed, eating and washing</li> <li>• identify daily cycles such as the sun comes up and goes down, tide comes in and goes out</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• identify events such as whether it's going to rain, when someone is going out to catch fish, when fruit is going to be picked, the day is going to be clear, when yam is planted and harvested</li> <li>• identify events such as the teacher might be absent, someone may be sick, their school team might win</li> </ul>	<p>Students will be achieving this outcome when they, for example</p> <ul style="list-style-type: none"> <li>• identify events that will happen such as landslides, volcanic eruption, river flooding, high tides, start and finish of school</li> <li>• identify events that might happen such as it will rain, it is going to be windy, wet clothes will dry quickly if the wind is strong, the motor will start</li> <li>• identify events that never happen such as one can find a chest of gold at the end of a rainbow, a chicken that lays a golden egg, a cow that jumped over the moon, that one will live forever</li> </ul>

## Assessment and reporting

Assessment and reporting practices described here are detailed further in the *National Assessment and Reporting Policy* and in other support materials produced by the Department of Education.

### Assessment

Assessment is the ongoing process of identifying, gathering and interpreting information about students' achievement of the learning outcomes described in the subject syllabuses.

Assessment in Elementary schooling is the continuous process of finding out what the students have learnt and still need to learn.

Elementary teachers should take into account Papua New Guinean cultural values and use local cultural practices where appropriate to assess and report students' achievement.

Assessment at Elementary level should use a range of methods with little emphasis on written tests. It should be based on the learning outcomes and arise from the everyday learning experiences of students. It is a process of:

- observing students at work
- conferencing or talking and questioning the students about their work and how they are thinking and feeling—their attitude towards work
- looking at work samples for information on what students can do.

Through these processes teachers gather evidence of students' learning.

Continuous assessment for young students is essential. Their knowledge and skills are continually changing as they learn more. It is important for teachers to be aware of what the students know, can do and understand. When this information is known about the students in the class, programming can be made more relevant and meaningful to match the students' needs..

### Recording and reporting

Teachers must keep accurate records of students' achievement of the learning outcomes and report these achievements in fair and accurate ways to parents and guardians, teachers, students and others. Recording methods may include:

- journal, diary or anecdotal notes
- portfolios
- progressive records
- checklists
- work samples with comments written by the teacher.

Student reports should be based on assessment information collected from ongoing assessment. Schools will decide how reports will be presented to best suit the needs of their communities.

When students first start school in Elementary Prep, parents and guardians will be very eager to hear about their child's progress. Teachers should consider holding a parent-teacher interview either at the end of the child's first term at school or early second term.

In Elementary 1, teachers may decide to hold formal talks with parents and guardians half way through the year and at the end of the year.

In Elementary 2, teachers may decide to hold formal talks with parents and guardians in the middle of second term and provide them with a written report at the end of the year.

## **Evaluation**

Teachers will use assessment information to evaluate the effectiveness of their teaching, learning and assessment programs and to make improvements to 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.

## References

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# **Cultural Mathematics**

## **Elementary Syllabus**

### **Issued free to schools by the Department of Education**

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## **Secretary's message**

The current reforms in education have been in progress since 1992. The Education Reform has emphasised community-based schooling, the use of vernacular languages in schools, the introduction of Elementary schools, the expansion of Primary schooling to Grade 8 and increased access to Grades 9 and 10.

This syllabus is to be used by Elementary (Elementary Prep, Elementary 1 and Elementary 2) students in Elementary schools throughout Papua New Guinea. This syllabus develops, links and builds upon concepts, skills and attitudes which flow into Lower Primary (Grades 3, 4 and 5). This syllabus provides a sound foundation for further learning in the reformed school system.

Students' language abilities, already gained in their home environments, must be respected, built on and extended. Vernacular languages have a large part to play in our students' formative years and their first language should be used to promote a deeper understanding of difficult concepts when this is appropriate.

This Cultural Mathematics Syllabus is a significant part of the Education Reform. It presents a coherent view of mathematics at the Elementary level of schooling. Mathematics at this level of schooling is based on the everyday mathematics used in the community. While this syllabus is designed for teachers of Elementary students, it will also be useful for developers of support materials, planners and Lower Primary teachers. Cultural Mathematics provides a sound foundation for future mathematical studies and the mathematical literacy necessary to do other studies.

Elementary education is community based. Elementary teachers speak the language of the local children so that they will be able to teach Cultural Mathematics using this vernacular language. With the help of community members and trainers, teachers will be able to develop a relevant community-based curriculum.

I commend and approve this syllabus as the official curriculum for Cultural Mathematics to be used in all Elementary schools throughout Papua New Guinea.

Peter M. Baki  
Secretary for Education