

TANZANIA INSTITUTE OF EDUCATION



NUMERACY TEACHER'S GUIDE

PRIMARY EDUCATION STANDARD I AND II

TANZANIA INSTITUTE OF EDUCATION

NUMERACY TEACHER'S GUIDE

**PRIMARY EDUCATION
STANDARD I AND II**

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Dr. Elia Y.K. Kibga
Acting Director General
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FOREWORD

Education Sector Development Programme (ESDP) insists on building capacity, skills and attitudes for providing quality education service in all levels. This plan focuses on achievements for primary education based on equity and quality of education for all children from preprimary to primary education.

Government initiatives to reach those broad objectives aim at promoting basic skills in Reading Writing and Numeracy (named as 3Rs) for early standard pupils in primary schools. The focus on 3Rs skills are keys in helping pupils to learn effectively. These skills can only be achieved when pupils work with teachers who are competent in the 3Rs. Although teachers for early standards received training for some schools, the training can not be considered as a complete intervention due to the fact that achieving teacher competence is not a one shot task.

In order to achieve quality of teachers, teachers themselves are supposed to learn continuously within and outside their working schools. The teaching of the 3Rs requires collaboration among teachers and mentorship scheme for upcoming teachers within the school as managed by the head teacher and senior early standard teachers. The mentorship process should include monitoring and evaluation of mentees to determine if they are providing high quality instruction in 3Rs. It is vital that schools be responsible for supporting teachers on school-based continuous professional development in numeracy if we are to achieve quality teaching and learning in classrooms.



Dr. Elia Y.K. Kibga

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CHAPTER ONE

ABOUT THE GUIDE

Introduction

Numeracy skills for English Medium Schools in Tanzania begin at Standard I. The pupils have been given more learning activities in Standard I and II in order to expose them to numeracy skills as the a strong foundation in learning.

Purpose of the Guide

This teacher’s guide has been prepared to enable teachers who teach in English Medium Schools to teach numeracy skills effectively right from Standard One. Numeracy is a Tanzanian national initiative to improve the quality of instruction and pupil’s performance at Standard I and II in specific three important learning areas which are Reading, Writing and Numeracy. However, this guide is demitted to Numeracy.

The guide emphasizes on developing mastery of basic literacy skills for primary school pupils.

Structure of the Guide

This guide is comprised of thirteen chapters. Chapter one is About the Guide, deals with introduction which explains the purpose, structure of the guide, users of the guide and competence table. Chapter two describes pupil’s numeracy readiness. Chapter three is about preparation for teaching. Chapter four deals with teaching and learning materials. Chapter five deals with Numbers, Computations and Relationships. Chapter six deals with Number operations. Chapter seven is about place values. Chapter eight deals with fractions. Chapter nine explains about Tanzanian currency. Chapter ten deals measurements. Chapter eleven deals with Geometry. Chapter twelve deals with data gathering and analysis while Chapter thirteen explains the relationship between counting and writing.

The Content of the Guide

The content of this guide have been prepared focusing on the main competences of numeracy. The guide is designed for early primary classroom teachers. It is an important tool that will help teachers in their numeracy instructions.

It includes;

- a) The important knowledge and skills pupils must acquire for numeracy,
- b) The learning indicators that support teachers in assessing pupil’s progress in these same areas,

- c) The indicators of teacher's knowledge and skills. These are necessary in providing effective and high-quality instruction in numeracy.
- d) Activities in two competence areas, that is, numeracy that are aligned with the indicators for pupil's learning. These provide high-quality examples teachers can use to increase their professional skills and teach pupils in their classrooms.
- e) Information about the basic resources and tools teachers should use during instruction to fully support pupil's learning.
- f) Continuous assessment to monitor pupils learning.

Targeted Users

The targeted users for the guide are primary school teachers, specifically in Standard I and II education quality assurers, teacher education tutors and curriculum coordinators.

The Numeracy Competence Table

Numeracy competence table have been prepared by TIE in collaboration with education stakeholders. It explains the competences required by a teacher in order to build numeracy skills for standard I and II pupils. Generally, it summarizes the content which is discussed in this guide.

The Importance of Numeracy Competence Table

Competence table for teaching numeracy skills is important for teachers and other educators, since numeracy program is a national priority in improving education. Recent research for pupils performance indicate that, the majority of primary school pupils have a weak foundation in mastery of numeracy skills. However, a large number of pupils who complete Primary Education do not have basic skills in numeracy. Therefore this table teaches to build pupils numeracy competences.

General Objectives of Numeracy Competence Table

The numeracy competence table is drawn from standard I and II syllabi. It provides detailed instructions that will lead teachers in identifying competences area, Activities to be Performed by the Pupil, learning indicators, continuous assessment, tools of assessment and teacher's competences.

Specific Objectives of Numeracy Competence Table

Specific objective of numeracy competence table include;

- a) Setting of learning standards for Standard I and II.

- b) Setting of learning standards in Numeracy.
- c) Setting of assessment standards in Numeracy

Structure Numeracy Competence

The Numeracy competence is for Standard I and II. Each page of the table includes competence area, pupil’s activities to be performed, and assessment processes and teachers competences.

Numeracy Competence: Standard I

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher’s Competences
<p>NUMBERS, OPERATIONS, AND RELATIOSSHIPS</p>	<p>To identify more and less</p>	<p>The ability to identify quantities that are more and less</p>	<p>Identify groups of objects that are more and less than other groups</p> <p>Tools: Objects in groups, Pupil demonstration</p>	<ul style="list-style-type: none"> - Understand pupil competences - Understand assessment competences <p>Prepare and use</p> <ul style="list-style-type: none"> - Number and symbol cards - Counting and grouping materials - Fraction flash cards - Hands-on materials for counting and adding <p>Demonstrate, and involve pupils with</p> <ul style="list-style-type: none"> - Using number cards and other hands-on materials for counting, addition and subtraction - Writing numerals - Reading number cards - Adding groups of objects - Arranging things in groups

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
	To count 1-9	The ability to count 1-9	Count from 1 to 9 Tools: Pupil Demonstration	<ul style="list-style-type: none"> - Correlating objects with numbers - Discussing numbers with correct pronunciation and understanding - Reading numbers in order and randomly - Categorizing things of equal amounts into groups - Folding, cutting and painting things of equal parts - Identifying Tanzanian coins and bank notes, and their value - Comparing values
	To read and write numerals	The ability to read and write numerals 1-9	Read numerals 1-9 Write numerals 1-9 Tools: numeral cards, writing supplies	
	To study the concept of zero	The ability to understand the concept of zero	Demonstrate understanding of zero, through discussion and use of objects, and object sets Tools: objects, object sets, pupil demonstration	
	To read and write 0	The ability to read and write the numeral 0	Read 0 and write 0 Tools: 0 cards, writing supplies	
	To add numbers 1-9	The ability to add numbers 1-9 correctly	Add correctly, using objects and number sentences Tools: objects, writing supplies	
	To perform the reciprocal addition	Adding numbers with the same result, when changing the order of numbers	Add correctly, using number sentences in different orders Tools: number sentences	

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
	To perform the subtraction operation	Subtracting numbers 9-1	Subtract, using objects and number sentences Tools: objects, number sentences	
	To count from 1 to 10	The ability to count in order up to 10	Count up to 10 Tools: Pupil Demonstration	
	To read numeral 10	The ability to identify and read the numeral 10	Identify and read the numeral 10 Tools: Number cards	
	To write numeral 10	The ability to write the numeral 10	Write numeral 10 Tools: Writing supplies	
	To identify number 11- 100	The ability to identify and read numbers 11 – 90	Identify and read numbers 11-90 Tools: Number lines, cards	
		The ability to write numbers 11-90	Write numbers 11-90 Tools: writing supplies	
	To add numbers that sum up to 50	The ability to add numbers that sum up to 50	Add numbers that sum up to 50 Tools: Number sentences	
	To subtract 50-1	The ability to subtract whole numbers 50 – 1	Subtract numbers 50-1 Tools: Number sentences	

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
	To count from 1 up to 100	The ability to count to 100	Count to 100 Tools: Pupil Demonstration	
	To read and write 100	The ability to read and write 100	Read and write 100 Tools: number card	
	To identify half of whole object	The ability to identify half of a whole objects	Cutting an objects in half Tools: shape, scissors	
	To split a group into two equal groups	Splitting things into equal groups	Split objects into equal groups Tools: Objects	
	To identify fractions	The ability to identify $\frac{1}{2}$	Identify the fraction Tools: fraction flash cards	
	To read fractions	Reading $\frac{1}{2}$	Read the fraction Tools: fraction flash cards	
	To write fractions	Writing $\frac{1}{2}$	Write the fraction Tools: writing supplies	
	To identify quarter of whole objects	The ability to identify one quarter of a whole objects	Cut an object into four equal pieces Tools: object, scissors	
MEASUREMENTS	To identify Tanzanian coins and bank notes	The ability to identify Tanzanian coins and bank notes	Identify coins and bank notes Tools: coins and bank notes	<ul style="list-style-type: none"> - Understand pupil competences - Understand assessment competences

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
		(50, 100, 200 coins; 500, 1000, 5000, 10000 bank notes)		Prepare and use - questions for discussion - objects for comparison
	To compare values	The ability to compare the value of coins and bank notes (more and less)	Compare value of coins and bank notes Tools: coins, bank notes, pupil demonstration	- Clocks Demonstrate, and involve pupils to - Discuss concepts of time, length, mass, and volume
	To add coins	The ability to add 50 Tanzanian shilling coins to get 100	Add coins Tools: coins	- Involve in experiments to understand the concept of time, length, mass, and volume
	To identify before/after sooner/later longer/shorter	The ability to identify time that is before/after, sooner/later, longer/shorter, and compare	Discussion of events and time, with identification of comparisons in time Tools: Questions, pupil discussion	
	To identify near/far short/long	The ability to identify things that are near/far, and short/long, and compare	Discussion of distances, and lengths Tools: Situation, items, questions, pupil discussion	
	To identify heavy/light things	The ability to identify things that are heavy and light, and compare	Description of objects, comparison of objects Tools: objects, questions, pupil discussion	

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
	To identify full/empty large/small volume	The ability to identify things that are full or empty, and things with large and small volume capacity	Description of things that are full and empty, and of large and small volume Tools: Objects, Questions, pupil discussion	
	To compare time, length, mass and volume	The ability to use non-standards measurements to compare time, length, mass, and volume	Us non-standard measurements to compare time, length, mass, and volume Tools: non-standard measurements, pupil demonstration	
GEOMETRY	To identify 2-dimensional shapes	The ability to identify standard 2-dimensional shapes (circle, square, triangle, rectangle)	Identify shapes Tools: shapes, pupil demonstration	<ul style="list-style-type: none"> - Understand pupil competences - Understand assessment competences <p>Prepare and use</p> <ul style="list-style-type: none"> - Models of 2-dimensional shapes - Models of 3-dimensional shapes <p>Demonstrate, and involve pupils in</p> <ul style="list-style-type: none"> - Discussing lines and shapes

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
		The ability to draw standard 2-dimensional shapes (circle, square, triangle, rectangle)	Draw shapes Tools: drawing materials, pupil demonstration	<ul style="list-style-type: none"> - Making two and three dimensional shapes - Asking and answering questions about shapes
	To identify 3-dimensional shapes	The ability to identify simple 3-dimensional shapes (sphere, cube, pyramid)	Identify shapes Tools: Shapes, pupil demonstration	
	To identify and draw straight lines	The ability to identify and draw straight lines	Identify straight lines Draw straight lines Tools: sample lines, drawing supplies	
	To identify and draw curved lines	The ability to identify and draw curved lines	Identify curved lines Draw curved lines Tools: sample lines, supplies	
	To identify and draw angles	The ability to identify angles	Draw angles Tools: drawing supplies	
DATA GATHERING AND ANALYSIS	To brainstorm data questions	The ability to brainstorm questions that can be answered by number/ data (How many desks? How many people?)	Participate in teacher-led group activities to ask and discuss data topics Tools: Observation of pupil behavior during data discussions	

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
				Examples of simple data representations (numbers and drawn)
	To collect simple data	The ability to collect simple data	Collect simple data Tools: Observation of pupil behavior during data collection	Demonstrate, and involve pupils in
	To create data presentations	The ability to participate actively in activities that create data representations	Participate in teacher-led group activities to create simple data representations Tools: Observation of pupil behavior during data representation	- Answering data questions - Counting data - Representing data - Discussing data
	To interpret simple data representation	The ability interpret simple data representations	Interpret simple data representations Tools: Simple data representations	

Numeracy Competence Table: Standard II

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
NUMBER, OPERATIONS, AND RELATIOSHIP	To identify more and less	The ability to identify quantities that are more and less	Identify groups of objects that are more and less than other groups Tools: Objects, demonstration	- Understand pupil and assessment competences Prepare and use - Number and symbol cards
	To count 101-500	The ability to count 101-500	Count from 101 to 500 Tools: Pupil Demonstration	- Counting and grouping materials - Hands-on materials for counting and adding
	To read and write numerals	The ability to read and write numerals 101-500	Read numerals 101-500 Write numerals 101-500 Tools: numeral cards, writing supplies	Demonstrate, and involve pupils with - Using number cards and other hands-on materials for counting, addition and subtraction
	To add numbers 101-500	The ability to correctly add numbers 101-500	Add correctly, using objects and number sentences Tools: objects, writing supplies	- Writing numerals - Reading number cards - Adding groups of objects
	To perform reciprocal addition operation	Adding numbers with the same result, when changing the order of numbers	Add correctly, using number sentences in different orders Tools: number sentences	- Arranging things in groups - Correlating objects with numbers - Discussing numbers with correct pronunciation and understanding
	To subtract numbers 500-101	Subtracting numbers 500-101	Subtract, using objects and number sentences Tools: objects, number sentences	- Reading numbers in order and randomly - Categorizing things of equal amounts into groups - Folding, cutting and painting things of equal parts
	To count from 501 to 1000	The ability to count in order from 501 to 1000	Count from 501 to 1000 Tools: Pupil Demonstration	- Identifying Tanzanian coins and their value

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
	To read numerals from 501 to 1000	The ability to identify and read numerals from 501 to 1000	Identify and read the numeral from 501 to 1000 Tools: Number cards	
	To write numerals from 501 to 1000	The ability to write numerals from 501 to 1000	Write numerals from 501 to 1000 Tools: Writing supplies	
	To add numbers that sum up to 999	The ability to add numbers that sum up to 999	Add numbers that sum up to 999 Tools: Number sentences	
	To subtract numbers 500-101	The ability to subtract whole numbers from 500 – 101	Subtract numbers from 500-101 Tools: Number sentences	
	To add numbers with carrying forward	The ability to carry when adding double digit numbers	Add double digit numbers with carrying Tools: word problems	
		The ability to borrow when subtracting double digit numbers	Subtract double digit numbers with borrowing Tools: word problems	
	To identify half of whole objects	The ability to identify half of a whole objects	Cutting an objects in half Tools: shape, scissors	
	To split things into equal group	Splitting things into equal groups	Splitting objects into equal groups Tools: Objects	
	To identify quarter of a whole object	The ability to identify one quarter of a whole object	Cut an object into four equal pieces Tools: object, scissors	

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
	To identify quarter of a group	The ability to identify one quarter of a group	Split objects into four equal groups	
	To identify fractions	The ability to identify $\frac{1}{2}$, and $\frac{1}{4}$	Identify the fraction Tools: fraction flash cards	
	To read fractions	Reading of $\frac{1}{2}$ and $\frac{1}{4}$	Read the fraction Tools: fraction flash cards	
	To write fractions	Writing $\frac{1}{2}$ and $\frac{1}{4}$	Write the fraction Tools: writing supplies	
	To identify Tanzanian coins and bank notes	The ability to identify Tanzanian coins and bank notes (50, 100, 200 coins; 500, 1000, 5000, 10000 bank notes)	Identify coins and bank notes Tools: coins and bank notes	
	To comparing the values	The ability to compare the value of coins and bank notes (more and less)	Compare value of coins and bank notes Tools: coins, bank notes, pupil demonstration	
	To add Tanzanian coins	The ability to add 500 Tanzanian shillings coins to get 1000	Add coins Tools: coins	
MEASUREMENTS	To identify before/after sooner/later longer/shorter	The ability to identify time that is before/after, sooner/later, longer/shorter, and compare them	Discussion of events and time, with identification of comparisons in time Tools: Questions, pupil discussion	

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
	To use clocks in hours and minutes	The ability to use a clock to tell time, hours and minutes	Tell time in hours and minutes Tool: Clocks	- Understand pupil competences - Understand assessment competences
	To identify near/far short/long	The ability to identify things that are near/far, and short/long, and compare	Discussion of distances, and lengths Tools: Situation, items, questions, pupil discussion	Prepare and use - questions for discussion - objects for comparison
	To identify heavy/light things	The ability to identify things that are heavy and light, and compare	Description of objects, comparison of objects Tools: objects, questions	- Standard measuring tools - Clocks Demonstrate, and involve pupils to
	To identify full/empty large/small	The ability to identify things that are full or empty, and things with large and small volume capacity	Description of things that are full and empty, and of large and small volume Tools: Objects, Questions, pupil discussion	- Discuss concepts of time, length, mass, and volume - Involve in experiments to understand the concept of time, length, mass, and volume
	To use non-standards measurements to compare time, length, mass, volume	The ability to use non-standards measurements to compare time, length, mass, and volume	Use non-standard measurements to compare time, length, mass, and volume Tools: non-standard measurements, pupil demonstration	
	To measure time, length, mass, volume	The ability to use standard measurements to measure time, length, mass, and volume	Use measurements correctly and accurately Tools: Standard measuring tools, tasks	

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
GEOMETRY	To identify 2-dimensional shapes	The ability to identify standard 2-dimensional shapes (circle, square, triangle)	Identify shapes Tools: shapes, pupil demonstration	<ul style="list-style-type: none"> - Understand pupil competences - Understand assessment competences
		The ability to draw standard 2-dimensional shapes (circle, square, triangle)	Draw shapes Tools: drawing materials, pupil demonstration	
	To identify 3-dimensional shapes	The ability to identify simple 3-dimensional shapes (sphere, cube, pyramid)	Identify shapes Tools: shapes, pupil demonstration	<ul style="list-style-type: none"> Demonstrate, and involve pupils in <ul style="list-style-type: none"> - Discussing lines and shapes - Making two and three dimensional shapes - Asking and answering questions about shapes
		The ability to draw simple 3-dimensional shapes (cube, pyramid)	Draw shapes Tools: Drawing materials, pupil demonstration	
	To identify straight lines	The ability to identify and draw straight lines	Identify straight lines Draw straight lines Tools: sample lines, drawing supplies	
	To identify curved lines	The ability to identify and draw curved lines	Identify curved lines Draw curved lines Tools: sample lines, drawing supplies	
	To identify angles	The ability to identify right angles	Identify right angles Tools: angles	

Competence Area	Activities to be Performed by the Pupil	Learning Indicators	Continuous Assessment	Teacher's Competences
DATA GATHERING AND ANALYSIS	To brainstorm data questions	The ability to brainstorm questions that can be answered by number/ data (How many desks? How many people?)	Participate in teacher-led group activities to ask and discuss data topics Tools: Observation of pupil behavior during data discussions	- Understand pupil competences - Understand assessment competences Prepare and use - Examples of simple data collection questions/topics
	To collect and tally simple data	The ability to collect and tally simple data	Collect and tally simple data sets Tools: Observation of pupil collection and tallies	- Examples of simple data representations (numbers and drawn) Demonstrate, and involve pupils in
	To creating data presentations	The ability to create simple data representations	Represent simple data sets Tools: drawing supplies	- Answering data questions - Counting data
	To interpret simple data presentation	The ability to interpret simple data representations	Interpret simple data representations Tools: Data representations	- Representing data - Discussing data

CHAPTER TWO

NUMERACY READINESS AND LEARNING CONCEPTS

Learning numeracy takes place simultaneously with reading, writing and oral language learning. These aspects of learning happen in a child's new social context immediately as he or she joins schooling.

Many young pupils come to school ready to learn, and some do not. Readiness depends upon several things:

Life Experience: The life experience the child has and had before entering school. through access to books, music, different groups of people, travel and learning experiences among others.

Oral Language Experience: The extent to which parents have actively talked to their child and encouraged their child to talk. A child that has been raised in a language-rich environment, where parents and children talk to each other, children are encouraged to explore new things and ask questions, etc.

Reading: The child will already know how to read before joining schools. A parent would have read loudly to a child no matter what was read. A child have an opportunity of seeing writings as normal thing and enough vocabulary.

Numeracy: Whether the child has been encouraged to play with objects to learn to count, sort, and classify. As a parent urged the child to learn to count with simple objects (Pebbles, sticks, bottle caps), and encouraged to do arithmetic in daily activities.

Age: The age of the child can be the cause of readiness. The child has start school very young, he/she has the physical and mental growth needed to participate fully in early learning skills development.

Gender: The gender of the child can also be cause of readiness. In general, boys take longer to be ready for school than girls. This does not mean they cannot compete equally, but boys simply take longer to mature.

All of these things influence how ready pupils are to learn on a first day. Many excellent parents do not know how to, or cannot provide children with these opportunities. The good news is that , teachers can help pupils to catch up, if they enter school less ready. It is advised that teachers support pupils who are less ready to learn.

Young children have certain characteristics that suggest the best ways for them to learn. These include;

- i) They need to have real learning materials (hands-on)
- ii) They need to work in groups (talking and group work)
- iii) They need to move (active learning and play)
- iv) They need to practice with ideas and materials (process-focused work, not product-focused work)
- v) They need extended time to practice new skills and ideas (deep instruction on a small set of skill)

Numeracy Readiness

Technical Skills: Young children need to learn to count and remember numbers. They also need to learn how to use the hands-on materials that are most helpful in learning early mathematical concepts particularly numeracy. Examples of activities and materials are included in this Teacher's guide.

Most classroom practices in Tanzania indicate that much of numeracy is about memorizing number and operations, and learning to solve problems correctly. However, the young learner also needs to understand the concepts that lie underneath these numbers and operations. By encouraging pupils to talk about mathematical concepts, and experiment with hands-on materials during learning, teachers will ensure that pupils are better prepared for the more difficult concepts pupils encounter later in school. Activities to support this experience are included in this Teacher's guide.

Adjusting Teaching to Early Learning Pupils

We can adjust our teaching to the pupils by increasing certain types of activities, and to decrease other types of activities. See the chart below as a general guide.

<i>Young Learners Should Do More</i>	<i>Young Learners Should Do Less</i>
Talk	Listen
Move	Sit
Use objects	Use pencil and paper
Question	Answer
Experiment	Demonstrate
Play together	Complete exercises
Be read to	Read on their own
Try to write in original ways	Copy others writing
Play games	Complete mathematics problems
Make and learn from mistakes	Be expected to know answers

Teaching and Learning of Numeracy

Teaching numeracy in the early primary classrooms is focused on helping pupils to understand the basic concept of numbers, number relationships, shapes and uses of shapes, measurement of time and things and using numbers to understand the world as we gather and interpret surrounding data/information. Young learners are ready to explore with hands-on materials in the numeracy classroom and must be given hands-on tasks with associated learning materials for them to learn basic concepts before they are asked to do written computation, or difficult mathematical manipulations. The competence areas discussed below, and the sample activities are specifically designed to meet the learning needs of early primary school pupils, and to gradually prepare them for more difficult mathematical processes.

CHAPTER THREE

PREPARATION FOR TEACHING

This chapter guides you on basic issues in doing important preparations so that you can teach Numeracy. You are the main facilitator in the process of learning. Thus, teaching preparations is an important aspect you are supposed to do before you go to teach in the class. This chapter guides you how to prepare a scheme of work and a lesson plan.

5.1 Preparing a Scheme of Work

A scheme of work is a plan prepared for a specific period of time that enables a teacher to analyse a syllabus and teach by developing the competence indicated in the syllabus. When preparing scheme of work, be aware of the subject's syllabus and school almanac. The structure of the scheme of work is divided into two parts, the first part is about preliminary information and the second part focused on scheme of work content. Part one includes school and teacher's name, subject, class, term and year while part two includes the following: main competence, specific competence, pupil's activities, month, week, number of periods, reference, teaching Aids/materials, assessment criteria and remarks.

The Importance of Scheme of Work

The scheme of work is important because:

- It enables a teacher to use his/her time well when implementing the syllabus.
- It enables another teacher to take over the teaching and learning process in case of emergency.
- It helps in monitoring the teaching and learning processes

Structure of the Scheme of Work

The Scheme of Work changes according to theories and the educational needs in the country. In this era of theoretical changes in teaching, the focus is on the building of the competence. Therefore, the structure of the scheme of work has been improved by considering those changes.

Structure of the Scheme of Work

Name of school..... Name of Teacher.....

Subject..... Class

Term..... Year

Main Competence

Specific Competence	Teaching Activities	Month	Week	Number of periods	Teaching Aids/ Materials	Assessment Tools	Reference	Remarks

The above ten sections of Scheme of Work are clarified below:

a) Main Competence

This is the ability to achieve a certain task effectively and successfully after a particular time of learning. The main competence is built up by various specific competences which are developed after participating in various learning activities.

a) Specific Competence

Specific competence is the ability built by a pupil in performing different activities in a specific time.

b) Teaching Activities

These are activities which a teacher should do in order to enable pupils to achieve targeted main activities. They are not identified in the Syllabus and in the guide so you are required to prepare them by considering the main activities you intend to teach.

c) Month

In this column, you are supposed to show a month which you will teach an activity concerned in order to build the competence intended to the learner.

d) Week

In this column you are supposed to show a week of a Month concerned in which you will teach an activity concerned in building competence to the learner. For example, the first week, second week and the third week.

e) Number of periods

In this column of the Scheme of work, you are supposed to estimate the number of periods you will use to enable pupils to perform a particular task. The estimations of time distribution are done to each specific activity. Therefore you have to use this estimation to obtain the number of periods for each main activity. It is also important to consider the scope and weight of each main activity in order to determine the number of periods needed to teach it. Finally consider a number of periods for a particular subject in a week.

f) Reference

It shows books and other references proposed in order to make the intended teaching and learning activity successful, examples of other references are journals, leaflets, charts, radio programs, video tapes, websites and various educational articles.

g) Teaching Aids/materials

In this part you are supposed to identify Teaching and learning aids you will use in the teaching and learning process in enabling pupil to perform an activity concerned. An example of teaching aids are real objects which are found in the local environment and which are related to the activity concerned, picture, drawings, copies of case studies, chats and different publications.

h) Assessment tools

In this column you are supposed to categorise assessment tools which you will use to achieve the action of assessing learning of the activity concerned. Some tools which you can use are like checklist, portfolio, exercises and performing charts.

i) Remarks

In this column you are supposed to write the information which shows success or failure of teaching and learning process. Therefore, you are supposed to show the level of learners in performing the activity intended. If pupils failed to reach the intended competence, you are supposed to give reasons and measures to be taken to rectify the situation.

Scheme of Work

Name of School: Mwendapole Primary School

Teacher's Name: Sikudhani Sichale

Class: III

Main Competence: Numeracy

Term: 1

Year: 2016

Specific Competence	Teaching Activities	Month	Week	Number of periods	References	Teaching Aids/ Materials	Assessment tools	Remarks
Apply the concept of shapes and figures to solve different problems.	i) Prepare instructions for facilitating pupils to identify 2D shapes and figures. iii) Prepare a game of two pupils picking in a box and reading flashcards with 2D shape and the related name. iv) Prepare drawing materials for pupils to practice how to draw 2D	January	2-4	24	Tanzania Institute of Education & Swai, F. (2007). Mathematics pupil textbook for standard 2. Dar-es-Salaam: Ben and Company Ltd.	2D real objects, 2D charts, drawing materials, 2D shapes and flash cards.	Portfolio Check list	The 2D shapes were identified and drawn correctly since pupils were able to pick 2D shape and read the corresponding name and draw the shapes correctly.

5.2 Preparing a Lesson Plan

The next footstep after preparation of scheme of work is to prepare a Lesson Plan. A lesson plan is a well thought out short term teaching plan developed by a subject teacher to facilitate teaching and learning within a specified single or double period. Usually, a teaching period in primary schools for standard I and II takes 20 minutes. A lesson plan outlines the teacher's objective and stages of teaching step-by-step. However, it provides a detailed description of the sequence of teaching and learning activities that will lead to the understanding of the specified objectives. Lesson plans are derived from the competences and specific competences in the scheme of work broken down into smaller components.

Therefore, the importance of lesson plan can be seen in the following:

- (a) It helps to manage time efficiently.
- (b) It enables to teach what was planned without skipping others activities.
- (c) It enables to be confidence and teach the lesson systematically.
- (d) It enables to prepare teaching aids or materials.
- (e) It enables to monitor teaching and learning.

Important things to consider when preparing a Lesson Plan

When preparing a lesson plan, it is important to consider the following:

- a) The specific competence and activities to be performed by pupil.
- b) Plan of specific competence and activities to be performed by pupil within the single or double lesson of 20 or 60 minutes.
- c) Reading text book, teachers' guide and other reference materials about the specific competence to be facilitated. Addition to that, prepare lesson notes.
- d) Prepare or improvise teaching and learning aids or materials to be used during the lesson.
- e) Pre-test your teaching and learning aids.
- f) Plan the time schedule for each specific competence step by step.
- g) Identify teaching and learning methods or techniques and assessment tools which will be applied in the lesson.

The Structure of the Lesson Plan

The structure of the lesson plan changes depending on the philosophy and educational needs of a country. The current structure of the lesson plan has been improved considering that learning and teaching aim at developing competences. The following is the structure lesson plan:

Name of school:

Name of teacher:

Subject:Class:

Date: Time: Period:

Number of Pupils

Registered			Present		
Boys	Girls	Total	Boys	Girls	Total

Specific Competence: _____

Main Activities: _____

Specific Activities: _____

Teaching Aids/materials: _____

References: _____

Stage	Time	Teaching Activities	Learning Activities	Learning Indicators
Introduction				
Developing Competence				
Consolidating Competence				
Conclusion				

Reflection: _____

Evaluation: _____

Remarks: _____

The clarifications of items of a Lesson Plan are shown below:

a) Main Activities

This is an activity which a teacher aims to develop to pupils after undertaking several periods of learning. The activities are outlined in the syllabus and are sub-divided into specific activities (specific activities).

In this item, you are required to write the objective of teaching and learning the main activity which a pupil is expected to accomplish. You are also required to write the intended knowledge or skill or attitude which a pupil will have developed after accomplishing the activity. The word used to explain the items are supposed to be general statements like a pupil should be able to know, understand and use.

b) Specific Activities

This is a specified activity which a teacher aims at developing to pupils in a single period of interaction. When preparing a lesson plan you are required to fill the sections of main and specific activities with objectives derived from activities you aim at developing to your pupils.

Specific activities should have features which can be summarized in the acronym **SMART**. It stands for features qualifying each specific activity to be; **Specific, Measurable, Attainable, Realistic and Time bound**. These features are further elaborated as follows:

- (a) **Specific:** This implies that a specific activity should be a single specified outcome to be performed.
- (b) **Measurable:** This means that each specific activity should clearly indicate criteria of measurement.
- (c) **Attainable:** It should be achievable; it should be an activity which you are capable of developing to the pupils within a period.
- (d) **Realistic:** Specific activities should be practically possible and real instead of actions that are only stated and possible in dreams or with assumptions.
- (e) **Time Bound:** This implies that it should have an aspect of time to be accomplished. In most cases primary school periods last for 40 minutes.

These are the activities that have been broken down from the main activity which the pupil will learn in the class in order to build the intended competence. These activities are not shown in the syllabus. You have an opportunity to add other activities that will help to fulfill the goal of the respective main activity. These activities have been attached at the end of this guide.

c) Learning Indicators

These are actions a pupil has to perform in every stage of the lesson in order to show the level of competence she/he intends to develop. Writing of the actions which indicate learning depends on the learning activity in the introduction stage, development of competence stage, consolidation of the competence and conclusion. Also, indicators of learning should match with specific activities so that they are achievable and understandable to teachers, pupil and the society at large. Refer to the example of a lesson plan to identify how to write indicators of learning.

d) Introduction

By using your experience, what things are you required to do in this first stage of teaching the lesson? Remember that the lesson you want to teach relates directly to the pupil's everyday life. Therefore it is important to understand pupils' prior-knowledge about that particular lesson

which will be a good foundation to enabling them to develop new knowledge. At this stage, you may:

- i) Use brainstorming method, questions and answers in finding pupils' prior knowledge.
- ii) To give pupils an activity that will enable them use the developed competences.
- iii) To encourage pupils use the developed competences through the use of case studies, songs, quizzes, number charts and cards, drawings or anything that is related to the new or previous lesson.

e) Developing Competence

In this stage, you need to teach specific activities you planned to implement at a particular lesson in order to develop the intended specific competence.

f) Consolidating the Competence

In this teaching and learning stage, you are obliged to involve pupils in merging the learned knowledge in order to have coherence in a particular concept. The application of the competence they develop in their actual life situations.

g) Conclusion

Make use of various methods when concluding your lesson by enabling pupils to get direction of a subject. For example, you can do the following things:

- i) To provide a summary of the lesson.
- ii) To give a chance to one of the pupils to conclude the lesson.
- iii) To ask questions which need short answers regarding what they learnt.
- iv) To ask the pupils to explain what they learnt

Aspects	Questions on Reflection	Questions on Evaluation
Activities to be done by Pupils	(i) Which new things have I learned from the result of this activity? (ii) How do I know that pupils learned as it was expected? (iii) Why the given activities enable/disable to build competence proposed?	(i) Which Standard/amount reached after the proposed activities to be done? (ii) Were the pupils learning as it expected? (iii) Activities given enable pupils to build proposed competence?
Teaching and learning methods	Did the teaching methods develop competence to the pupils or not?	Were the teaching methods effective?
Teaching and Learning Aids	How effective were the teaching/ learning aids?	Were the teaching and learning Aids effective?

Teaching and learning	(i) Did I explain the scientific concepts clearly or not? (ii) Why did I deviate from my plans?	(i) Were my explanations clear to the pupils? (ii) Which part of lesson was implemented different from I arrange? And why?
Pupils activities	(i) Are the pupils reached standard intended according to the explanation or not? And why? (ii) Are the pupils able to relate things they learn with the daily life or not?	(i) Are there pupils who excellent/poor in performance? (ii) Did the pupils relate their competence to their daily lives?

h) Reflection

The aim of this part is to provide you with an opportunity for developing your profession in the educational field. In order to reach this aim, you are supposed to do a reflection which will help you to improve your teaching. In this part you are supposed to ask yourself about teaching and learning in order to identify effectiveness and challenges raised in that process at the end to do improvement in the next teaching.

i) Evaluation

You have to stick on reflection you did about the whole process of teaching and learning, and then ask yourself about the extent at which pupils' performance of the activity holds the quality enough to develop the intended competence.

The following are some aspects and questions which can lead you in reflection and evaluation.

NOTE: Explanations about evaluation of teaching and learning can be given by considering the standard/quantity or value/quality of your performance and the pupil's performance. Also when reflecting about teaching and learning you are advised to use questions which target at efficiency and effectiveness of the teaching and learning process.

Remarks

After you have answered the questions on reflection and evaluation with other questions you might create, you have to give opinions and resolutions to take for improved future performance. Your remarks may be based on the following:

- i) Comparing the specific activities and your planned activities, explain if the lesson was a success or failure.
- ii) Identify the areas of teaching which you will change and specify the changes in order to improve the success of the lesson.
- iii) Identify new things you have learnt in the particular lesson.
- iv) Explain how you will help the pupils who did not reach the intended performance.

Structure of Lesson Plan

Generally there is no formal structure of a lesson plan worldwide. Each country organizes its structure depending on the type of curriculum and orientation they follow. Here is the structure of a lesson plan:

Lesson Plan

Name of School: Kalilonga Primary School

Teacher's Name: Salamaka Hamidu Busanja

Subject: Numeracy

Class: III

Date: 16/01/2016

Period: 1

Time: at 2: 00 - 2: 30 am

Number of Pupils					
Registered			Attended		
Boys	Girls	Total	Boys	Girls	Total
30	25	55	28	25	53

Specific Competence: Apply the concept of shapes and figures to solve different problems.

Main activities: Within several periods a pupil will be able to identify 2D shapes.

Specific Activities: Within a period of 30 minutes a pupil will be able to list 2D shapes correctly.

Teaching Materials: 2D real figures/objects, 2D charts, 2D shapes and flash cards, drawing materials.

Source: Tanzania Institute of Education & Swai, F. (2007). Mathematics textbook for pupil book 2; Dar-es-Salaam: Ben and Company Ltd.

Steps of Lesson Development

Stage	Time	Teaching Activities	Learning Activities	Indicators of Learning
Introduction	5 Min.	Facilitating pupils to revise the previous lesson about volume and link with the new knowledge of shapes of the containers. Example: Bottle, tins and basket of different design and shape.	i) Discover which container has much or little amount of liquid or solid objects. ii) Recognize different shapes of surface areas of the containers.	i) Volume of liquid or solid objects discovered accurately. ii) Different shapes of the container recognized correctly.

Developing Competence	15 Min.	<p>i) Use 2D charts and real objects to facilitate pupils to identify 2D shapes.</p> <p>ii) Facilitate pupils to sing a song of 2D shapes. Example: Triangle x 2 Oval, Circle x2 Rectangle x 2 Squares, Circle x 2 Star, little star; Those are shapes x2</p>	<p>i) Listening, asking and answering questions.</p> <p>ii) Singing a song and differentiate 2D shapes.</p>	<p>i) Answering questions about 2D shapes correctly.</p> <p>ii) Differentiate the shapes and their corresponding names correctly.</p>
Consolidating Competence	5 Min.	Support the game of two pupils picking and reading flashcard of the shape with the corresponding name from the box.	<p>i) Picking the cards from the box.</p> <p>ii) Display the 2D shape picked.</p> <p>iii) Read the name of the 2D shape from the flashcard picked.</p>	<p>i) 2D shapes picked and named correctly.</p> <p>ii) Answering questions correctly as per shape and name of the 2D shapes.</p>
Conclusion	5 Min.	Appoint one pupil to do debriefing of the lesson.	Do debriefing of the lesson by listing the 2D shapes identified.	The 2D shapes listed correctly.

Reflection

- Why the teaching method used in learning made the lesson to be achieved or not?
- Why my explanation in the class led some pupils to understand or not?
- Why did the pupils participate fully in learning or not?

A sample of teacher's reflection about teaching and learning

I made efforts to apply interactive teaching and learning methods to make pupils cooperate and learn effectively. Pupils were excited with the methods because they allowed using their prior knowledge to develop the intended competence. I was amazed that they were reluctant to go out during break time. However I had some flaws in classroom management techniques and I spent some few minutes of the next period which belonged to a different subject

Evaluation

My clarification and explanation enabled 50 pupils out of 53 to list 2D shape correctly. 3 pupils out of 53 were at the beginning level because they failed to understand my explanations. However, pupils have managed to get skills of listing 2D shapes through real objects, charts, flashcards and the song which they sing vigorously and enjoy while learning how to list 2D shapes.

Remarks

In the next lesson, I will improve my clarification and I will make a close follow up to those with special need. Few pupils who are at beginning level and 2 pupils who were absent I will assist them during break time.

NOTE: Teacher, remember that one specific activity can be done within a period of one or more depending on the depth and scope of the specific activities.

CHAPTER FOUR

TEACHING AND LEARNING MATERIALS

Mathematics is about objects and events we see and witness in our contexts. We do mathematics in games and sports. We walk and talk mathematically! We eat and breathe mathematically. Our existence is mathematics, we are living and persist in the environment based on various mathematical objects. Hence teaching and modeling mathematical concepts and computation become fun and interesting if we use teaching aids and tools we are familiar with from our surrounding environment, use of real objects, real events, games and sports we like, pictures and drawings in teaching and learning mathematics is important to make the subject matter understood.

VOCABULARY

One important resource in the mathematics classroom is the **vocabulary** of mathematics itself. A pupil could use mathematical language that are endless tools and unforgettable lesson in intergrating prior knowledge and new concepts.

When teaching and modeling new mathematics concepts, teachers must ensure that key words to be used during the lessons are identified and written on flash cards, blackboard slides etc. Meanings of key words and usage must be understood by the teacher and well modeled in classroom. For example teachers should prepare key words for each topic he/she is teaching:

Numbers, Operations and Relationships	
Topic	Key Words
Introduction to Number Concepts:	More, Fewer, Same, Number words, One, Two, Three, Four..... Ten, Digits etc.
Introduction to Concept of Zero	Emptiness, Nothing, Zero etc.
Concept of addition and subtraction	Add, Addend, Addition sentence, Equal to, Subtract, Subtraction sentence, Equal sign, Addition sign, subtraction sign, Number line etc.
Place Value	Tens, Ones, Carrying, Regrouping etc.
Concept of Fractions	Whole, Parts, Equal parts, Fraction, Half, Quarter
Currency	Coins, Bank notes, Value
Measurements	
Times of a Day	Morning, afternoon, evening, night
Length	Far, near, long, short
Mass	weight, heavy, light
Volume	Volume, capacity
Geometry	

Plane Shapes	Flat, Side, Angles, Triangle, Square, Rectangle, circle, line
Solid Shapes	Cylinder, cube, cone, pyramid
Data Gathering and Analysis	
Data	Data, events, objects
Data Representation	Pictorial, bar charts
Data Analysis	Questions and answers

Hands-on Materials

Mathematics teachers must prepare and use real-world hands-on materials. Some of these materials can be locally made at no cost, some are readymade and must be provided, and some can be sourced from online teacher resource sites. Teachers should plan lesson activities with locally available real objects that can be gathered or made by pupils themselves, or prepared by the teacher as much as possible. Teachers should not rely on outside materials in order to use effective instructional strategies. Below are examples of real objects/materials that can be prepared and used in teaching and learning.

Numbers, Operations and Relationships	
Topic	Real object /Teaching Aids
Introduction to Number Concepts:	Grains, Straws, sticks, shells, bottle tops etc. Number charts, Flash cards
Introduction to Concept of Zero	Empty containers (boxes, tins, buckets etc.), fruits.
Concept of addition and subtraction	Grains, Straws, sticks, shells, bottle tops etc. Flash cards, Addition charts, Number line, etc.
Place Value	Straws, sticks, tying string/rubber band, Number plates, abacus, pockets of ones and tens etc.
Concept of Fractions	A4 paper, an apple, orange
Currency	Coins, Bank notes,
Measurements	
Times of a Day	Pictures, drawings
Length	Ropes (short & long), Tall & Short Things
Mass	Fat and thin, big and small things
Volume	Bottles, cups, glasses, tins etc.

Geometry	
Plane Shapes	Paper, boxes
Solid Shapes	Coconuts, balls, cones,
Data Analysis	
Data	Pictures, drawings
Data Representation	Pictures, drawings
Data Analysis	Questions and answers

CHAPTER FIVE

NUMBERS, COMPUTATIONS, AND RELATIONSHIPS

The concept of numbers, counting, reading and writing number, and number relationships are the crucial part of numeracy and therefore teacher must have a clear concept of numbers, counting and how the two are related so as to support pupils adequately.

Teacher Competence: The teacher should be able to;

- i) Show the activity that builds the number concept in order the pupils to know that the number can be represented in different ways.
- ii) Teach the pupils to count repeatedly by singing so as to be fluent in counting.
- iii) Putting together the concepts of number and fluent counting by showing how numbers related with real objects

What is the concept of number?

Number concept is a fluidity and flexibility with quantities. Pupils develop a concept of what numbers mean which helps them become fluent in counting, and eventually perform mental mathematics and problem solving. Therefore, a number relates to a quantity that is represented in a different ways.

Why is it important?







Numbers are the basis for all mathematics and real life quantities. Numbers help pupils to become fluent in quantity computation.

How do I teach it in my classroom?

Teaching and learning materials: Use different real objects to represent different numbers, for example: sticks, stones, bottle caps, or straws. Flash cards, number charts, number line, skipping rope, drum beats, claps, drawings and pictures can also be used.

Example of Activity 1: Many and Few Identification: Introduce the concept of number by asking pupils to identify few and many things in groups. By doing the following;

- Make two groups of straws with unequal quantities. Then ask pupils to identify which group has more straws than the other.
- Then make two groups of equal number of items difficult to tell which one has few or many things, from there introduce the concept of count to be certain which group has more items.

1. 	
2. 	
3. 	


Assessment: Observe if the pupils are able to identify many and few.


Example of Activity 2: Building vocabulary (numbers)

- By singing 1 up to 9
- Clapping hands pronouncing 1 up to 9
- Walking steps pronouncing 1 up to 9
- Jumping a rope pronouncing 1 up to 9
- Throwing a ball to each other as they alternately pronouncing 1 up to 9

Assessment: Observe if the pupils are able to mention vocabularies of number correctly.

Example of Activity 3: Introduce oral counting 1 up to 9 sequentially with and without real objects. Starting with real objects (such as sticks), orally count 1 up to 9 in a class. As you count 1 up to 9, hold up the sticks to the class to show your pupils how many are represented in each number (i.e. five = five sticks). Ask your pupils to recite the numbers after you count 1 up to 9. It is strongly encouraged: each pupil should have more than 9 sticks to count in groups of respective quantity along with you.

One = 

Two = 

Three = 

Nine = 


Other activity that would be done during counting

- Do the same activity with fingers. Using your fingers, orally count up to 9. As you count, hold up the representative number of fingers to show your pupils. For example, 3 fingers is the number 3.
- Repeat the above exercise by clapping hands while counting 1 up to 9 pausing while counting the number, walking steps while counting 1 up to 9, jumping a rope while counting 1 up to 9 and Dribbling a ball while counting 1 up to 9.

Assessment: Observe if pupils are able to count real objects or fingers correctly

Example of Activity 4: Numeral Identification: Picking a numeral card in a box and read it loudly and match with real objects. Guide pupils to pick a numeral card in a box and read it loudly and match a card with equal number of drawings. Game of two pupils picking and reading numeral flash cards in a box. Arrange and read numeral flashcards in ascending order.

Show the pupils the number on the flashcard, and the number of real objects you are holding. Then show the numeral with the word and finally the numeral without word or real objects. Repeat this activity using your fingers as real objects while pupils are correlating the number of your fingers shown with the number written on board.

One =  = 1

Two =  = 2

Three =  = 3

Nine =  = 9

Assessment: Observe if pupils are able to;

- 1) Match real objects and numerals correctly
- 2) Read numerals correctly
- 3) Arrange numerals in ascending and descending order

Example of Activity 5: Fluency Counting: Reinforce counting 1 up to 9 sequentially using a number chart. As you count 1 up to 9, point to the number on the number chart and say it loudly. Have pupils recite after you. Repeat counting to 9 using the number chart at least 5 times. This helps pupils learn the sequential progression from 1 to 9. If number charts are not available, flash cards can be used. Ideally, however, it would be good to start with a number chart and then use flashcards, so that pupils see the number patterns. The number chart from 1 to 9 can locally be prepared by the teachers using flip chart or manila cards.

Assessment: Observe if pupils are able to;

- 1) count fluently 1- 9
- 2) Use a number chart to fill in missing numbers.

1	2		4	5			8	9
---	---	--	---	---	--	--	---	---

Assessment: Observe if pupils are able to count fluently up to 9

ASSESSMENT TIP: At the end of the lesson, point to a number from 1 up to 9 on the number chart, or write the number on the board. Make sure all pupils can clearly see the number. The pupils put their heads down on their desks and close their eyes. Ask the pupils to use their fingers to demonstrate what the number is. You can also point to numbers at random on the number chart, or hold up random numbers using a flashcard and ask the entire class to recite what the number is.

Example of activity 6: Writing numerals

- i) Using forefinger to write numerals in the air, and on the desk. The teacher should demonstrate this by doing it in the classroom facing the blackboard.
- ii) Using a stick to write numerals on the ground. Teacher should demonstrate how to hold a stick and support the pupils to write numerals together hold his/her writing hand.
- iii) Using a chalk to write numerals on a slate/board.
- iv) Using a pencil to write numerals in guided exercise books.

TEACHING TIP: Key principles of writing numerals

- (i) Starting point and end point,
- (ii) Writing direction,
- (iii) Writing numerals from a starting point to the end point without breaking (1, 2, 3, 6, 7, 8 and 9),
- (iv) Writing numerals with breaking (4 and 5).



Assessment: Observe if pupils are able to write numbers correctly

Concept of Zero

Teacher Competences: The teacher should be able to;

- i) Understand the concept of zero and involve pupils in the classroom
- ii) Demonstrate in the classroom how to read and write zero

What is Zero?

Zero is a notion of emptiness. No quantity exists.

Why is important?

It helps pupils to understand that zero represents non-existence state (no quantity)

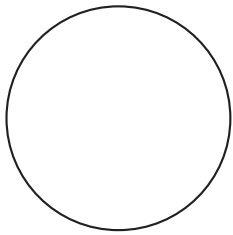
How do I teach it in my Classroom?

Teaching and learning materials: Use different real objects to represent the concept of zero, for example: sticks, stones, or straws in containers. Flash cards, number line, drawings, and pictures should also be used.

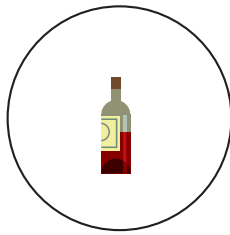
Example of Activity 1: Concept of Zero

Introduce the concept of zero by drawing 4 big circles on ground in series. Leave the first circle with nothing. Let one pupil stand in the second circle in the series, then two pupils in the third circle, and 3 pupils in the fourth circle. Ask pupils in random to count the number of pupils standing in each circle. Ask them again to count how many pupils are in the first circle. Use several similar examples and make sure that there is emptiness in the example. Guide the pupils to understand that “emptiness” is called “**zero**”.

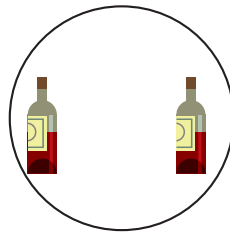
Example using bottles



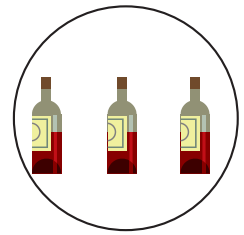
Empty



one bottle



two bottles



three bottles

Example of Activity 2: Reading and Writing Zero:

Guide pupils to understand that “emptiness” is read as “**zero**,” and it is represented numerically by a symbol “**0**”. Model how “0” is written as indicated below. Have pupils practice writing 0 in air, ground, and slates, later in exercise books.



Assessment: Observe if pupils are able to;

- i) Use flash cards or containers with and without drawings/things to identify representations of zero.
- ii) Read “0” correctly
- iii) Write zero as a numeral

CHAPTER SIX

NUMBER OPERATIONS

This chapter includes addition, subtraction, writing mathematical sentences and computation.

Teacher's Competence: The teacher should be able to;

- Involve pupils in developing a conceptual understanding of addition and subtraction as an increase and decrease of things.
- Introduce addition, subtraction and equal signs to make a numerical sentence.
- Teach pupils to develop fluent computing skills so that they become competent in adding and subtracting numerals.

What is Addition, Subtraction, Numerical mathematical sentences and computation?

Addition is the notion of putting thing together. Subtraction is the notion of removing things from a group of things. Mathematical sentence is the notion of putting together or taking away things using numerical signs. Computing is carrying out mathematical procedures, such as adding and subtracting, in a flexible, accurate, efficient, and appropriate way.

Why is it important?

Addition helps pupils to understand that quantities can increase. Subtraction helps to understand that quantities can decrease. Numerical mathematical sentences bring mathematical concepts into writing. Computation is the basis for becoming fluently in calculations, mental mathematics, and progressing to more complicated computations such as two digits addition and subtraction.

TEACHING TIP: It is important for a teacher to teach that there is no one way to solve a problem and those pupils can have more than one strategy to solve a problem. Also, it is important for teachers to understand that computing is not in isolation from understanding; understanding and computing are deeply linked and support each other.

How do I teach it in my classroom?

Teaching and learning materials: Use different real objects, number plates, abacus, addition and subtraction charts, drawings/pictures, flash cards and number lines.

Example of activity 1: Concept of addition and subtraction-Introduce the lesson by giving pupils activities that explain the concept of addition and subtraction by increasing and decreasing things using real objects.

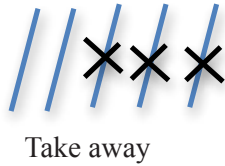
Addition

Hold 5 sticks and hand them over to one pupil. Hold another 3 sticks and hand them over to the second pupil. Ask the two pupils to hand over their sticks to another third pupil. Then ask the third pupil to say how many sticks she/he is holding. This activity can be repeated using different numbers and asking individual pupils, group of pupils or the entire class to respond.

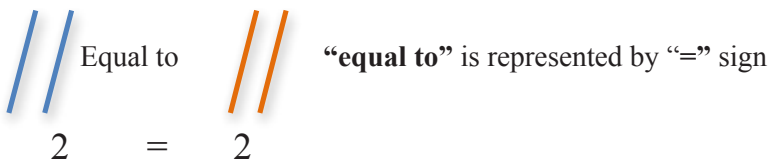


Subtraction

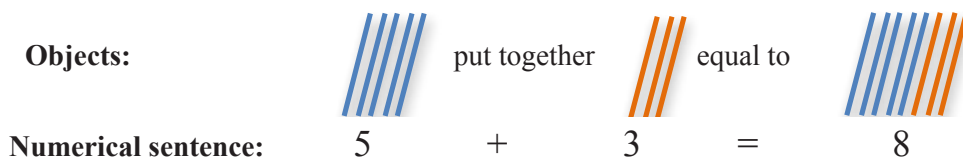
For example, hold 5 sticks and hand them over to one pupil. Ask the second pupil to take 3 sticks from the first pupil and go away. Then ask the third pupil, to say how many sticks the first pupils remain with. This activity can be repeated using different numbers and asking individual pupils, group of pupils or the entire class to respond.



Example of activity 2- Introduction to the addition, subtraction and equal signs: Introduce addition, subtraction and equal signs by connecting to a lesson like the example above on concepts of addition and subtraction using real objects. Start introducing equal sign before addition and subtraction. Introduce the equal sign “=” and explain to pupils that this means when there are equal quantities. Using real objects demonstrate what it means when quantities are equal. For example, 2 sticks = 2 sticks. The example of a see-saw can also be used to here to discuss balance and equal sides.



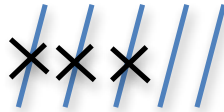
Write the addition sign on the board and explain to the pupils this means that, we are bringing quantities together to *make more*. Use real objects to demonstrate how addition makes more. Demonstrate multiple examples to your pupils.



Write the subtraction sign on the board and explain to the pupils this means that taking away quantities *makes less*. Use real objects to demonstrate how subtraction makes less. Demonstrate multiple examples to your pupils.

Word Sentence: 5 sticks if we take away 3 sticks, we remain with 2 sticks.

Objects:



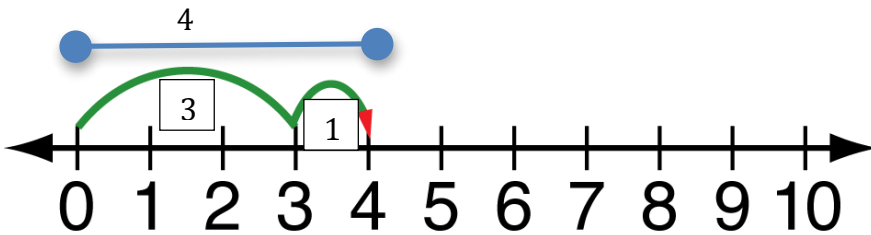
Take away

Numerical Sentence:

$$5 - 3 = 2$$

Example of activity 3: Computing; Use a number line to demonstrate addition and subtraction. Draw a number line on the board before class starts up to 10. Explain how the number line works. Demonstrate the concept of addition and subtraction using the number line. When numbers are added together then the value increases and you go up on the number line. Demonstrate multiple examples to pupils.

$$3 + 1 = 4$$



Demonstrate the same for subtraction and use multiple examples.

Example of activity 4: Computing; Use addition and subtraction charts to demonstrate addition and subtraction. Draw the charts and explain how they work to show repeated pattern of addition and subtraction.

Addition Chart

2		4		
3	4			
4		6		
5			8	
6				10

Subtraction Chart

4				0
			0	

Assessment: Observe if pupils are able to;

- a) Arrange flash cards so that they form a numerical sentence.
- b) Fill in numerical sentences (with blanks) with the correct sign/numeral.

ASSESSMENT TIP: Have pupils team-assess in addition, subtraction and writing numerical sentences. Ask addition or subtraction question to pupils and select one pupil to answer the question. Select another pupil to tell whether the answer given is right or wrong. Select another pupil to explain why the answer is wrong or right.

CHAPTER SEVEN

PLACE VALUE

In this chapter the concept of place values have been explained. Also explained how to add and subtract numbers which has more than one numerals.

Teacher's Competence: The teacher is able to;

- a) Understand the concept of place value
- b) Demonstrate the concept of place values and the concept of a bundle in classroom.
- c) Bring together adding and subtracting with place value concepts, two double digits addition and subtraction and regrouping/carry forward.

What is Place Value?

Place value is a notion of bundling things into groups of 10s, 100s, and 1000s. (Arrange things into groups of tens and ones).

Why is it important?

It helps to understand value of numerals that have more than one digit.

Teaching and learning materials: Use different real objects, number plates, and an abacus

How do I teach it in classroom?

Example of Activity 1: The Concept of Place Value; Use real objects to demonstrate the concept of place value by forming bundles. When the quantity is 10, then it can be grouped into a bundle. A bundle has a tens place and an ones place. Using a plate number (available in Tanzania), or drawing a tens and ones table on the board, demonstrate how numbers 10 and above are written.

For example, ask the pupils to count up to 9 sticks. Ask them to add 1 stick to the 9 sticks which they are holding and ask them, how many sticks they are holding all together. If they fail to give correct answer, then tell them that what they are holding are ten sticks all together. Let them hold the ten sticks in their one hand. Ask them to tie up all the ten sticks by a rope in a single bundle. Guide them to interpret that single bundle of sticks is written as "1" and NO remains stick untied which is written as "0" as indicated by arrows in the illustration below.

Tens	Ones	Things
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
1	0	
1	1	
1	2	

Use the illustration above to show the pupils place value of tens and ones and how to write it for other numbers such as 11, 12, and 20. For example, 12 and 25 in tens and ones is written as shown below:






Tens	Ones
1	2
2	5

Additional Activity: Use real objects, to count by looking a place value in the chart, and one bundle representing tens and one real object representing ones.



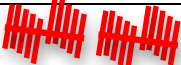



Example of Activity 2: Adding and Subtracting: Using real objects demonstrate two digit addition and subtraction. After pupils are comfortable adding and subtracting up to 9, introduce adding and subtracting up to 99

Addition without carrying

For example for addition, if $12 + 4 = 16$, explain how 12 is made with one bundle and 2 remaining. When 4 are added, then it is added to the 2 remaining. Recount all the real objects to show how 16 are formed. Demonstrate multiple examples. Now apply this to the place value chart. Use the real objects to reinforce where the numbers are placed and how 4 are added to 12 to make 16 as indicated above.








	Tens	Ones	Things	
+	1	2		
		4		
	1	6		

Use the real objects to reinforce where the numbers are placed and how 15 is added to 23 to make 38 as indicated below. Do it for multiple examples.

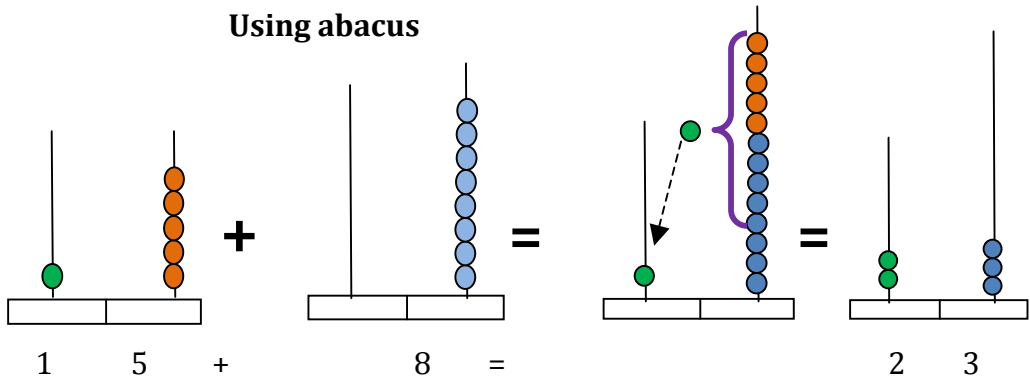
	Tens	Ones	Things	
+	1	5		
	2	3		
	3	8		

Addition with carrying

For example for addition, if $15 + 8 = 23$, explain how 15 is made with 1 bundle and 5 remaining. When 8 are added, then it is added to the 5 remaining, making total of 13 things which have created **another 1** bundle and 3 remaining. The created bundle made by adding 8 and 5 is **carried over** and added to the 1 bundle made by 15.

	Tens	Ones	Things	
+	1	5		
		8		
				
	2	3		

Using abacus



Subtraction without regrouping

Example: for subtraction, if $15 - 3 = 12$, explain how 15 is made with 1 bundle and 5 remaining. When 3 are subtracted, then it is subtracted from the 5 remaining, resulting to 12.

	Tens	Ones	Things
-	1	5	
		3	
	1	2	

Subtraction with regrouping

Example. For subtraction, if $23 - 18 = 5$, explain how 23 is made with 2 bundle and 3 remaining. When 18 is subtracted, then it is subtracted from the 2 bundles and the 3 remaining, resulting to 5.

	Tens	Ones	Things
-	2	3	
	1	8	
		5	

Additional Follow-Up or Independent Activities

1. Use real objects, to count to the number in the place value chart. The bundle goes the tens place, and the remaining real objects go the ones place.

2. Practice with abacus on concept of place value in addition and subtraction question.
3. Practice more exercises on adding and subtracting.

Assessment: Observe if pupils are able to;

- 1) Represent a two-digit number using real objects
- 2) Draw a place value table of ones and tens, and use real objects within the table to represent two-digit numbers.
- 3) Have pupils pick two-digit flash cards, and use the abacus to represent that number
- 4) Ask pupils to do addition and subtraction exercises that involve carrying and borrowing in their exercise books.

CHAPTER EIGHT

FRACTIONS

This chapter deals with fraction. The fraction numbers has been used before the decimal numbers as a smaller piece than the whole object (1). Fractions are still used in our context for example; in cooking, building, tailoring and in markets. Fraction numbers are present everywhere so we need to understand its concept.

Teacher's competences: The teacher is able to;

- a) Demonstrate the concept of fractions.
- b) Demonstrate how fractions are written numerically.

What are fractions?

Fractions are equal parts that make up a whole.

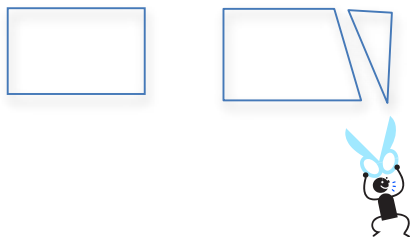
Why are fractions important?

It is important for pupils to understand that a whole is made up of parts, and can be split into multiple equal parts.

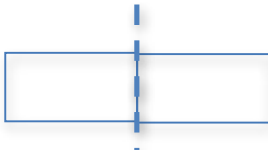
How do I teach it in my classroom?

Teaching and learning materials: Use of real objects, such as paper, fruits, containers and liquids, and drawings of fractions.

Example of activity 1: The Concept of Fractions: Using real objects to demonstrate how fractions are parts of a whole. Using a sheet of paper ask a pupil to cut it once into 2 parts. Ask the same pupil to say what she/he got. Ask the same question to the rest of the pupils. Guide them to understand that what she/he cut are two parts of a paper that are not equal. Show them that the 2 parts of the paper cut can be brought together to make up 1 whole. You can also use fruits, or other real objects to demonstrate this concept.



Using a sheet of paper, fold it in half and cut it. Show that the 2 equal parts of the paper make up 1 whole. Conclude the activity by guiding the pupils to understand that each equal part of a whole are called fraction. Demonstrate this with multiple examples using other real objects and drawings (regular shapes, etc).



Fold into equal parts

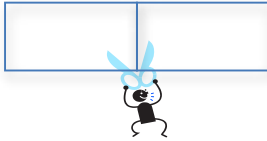


cut into equal parts

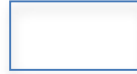


two equal parts

Example of activity 2: The Concept of Half; Use something similar to example 2 above to introduce the concept of half. Explain that each of the two equal parts is called half of the whole paper. This can be further demonstrated by writing half on each of the paper parts.



half



half

Reinforce the concept of **half** by using different drawings. For example, shade a **half** in a circle or a **half** in square drawings. Match the fraction to the drawing. Conclude the activity by guiding the pupils to understand that **half** of a whole is numerically represented as $\frac{1}{2}$, interpreted as 1 part out of 2 equal parts.



1



$\frac{1}{2}$



$\frac{1}{2}$

Assessment: Observe if pupils are able to;

- Match drawings on a board that represent.
- Shade drawings on a board that represent $\frac{1}{2}$.
- Cut paper and things into $\frac{1}{2}$.

CHAPTER NINE

TANZANIAN CURRENCY

This chapter deals with Tanzanian currencies such as coins, bank notes, values of coins and bank notes; addition and subtraction of money values.

Teacher's competences: The teacher is able to;

- a) Involve pupils to identify Tanzanian currency used as means of exchange.
- b) Compare values of coins and bank notes as means of facilitating small and big exchange values.
- c) Perform addition and subtraction computation of money values.

What is Currency?

Currency or money is special designed metal coins and paper bank notes that are assigned values and legally accepted in a certain country.

Why is it important for pupils to know?

Currency or money is important because they facilitate exchange of assets and payments.

How do I teach it in my classroom?

Teaching and learning materials: Real Tanzanian coins and bank notes in circulation, pictures and drawings of coins and specimen bank notes of Tanzania, real things/pictures sold in shops and market and price tags.

Example of activity 1: Tanzanian coins and bank notes

Coins

Take pictures or drawings of Tanzanian coins currently in circulation or actual coins if available. Mix them with coin like metals or other country coins. Ask the pupils to pick the coins they think are Tanzanian coins in circulation. Ask the pupils why they picked certain coins. Let them observe the two sides of the coins and mention what they see in both sides.

Bank notes

Take real Tanzanian bank notes currently in circulation or pictures/drawings. Mix them with other country's real bank notes if available or pictures/drawings. Ask the pupils to pick the bank notes they think are Tanzanian bank notes in circulation. Ask the pupils why do they think what they picked are certainly Tanzanian bank notes. Let them observe the two sides of the bank notes and mention what they see in both sides.

Example of activity 2: Value of coins and bank notes; Let the pupils explore the value of coins and bank notes by giving them activities that allow them to compare the values of different coins and bank notes. Set up a mock shop in the classroom where pupils are given coins and bank notes to buy things. For example give one pupil 50 shillings coin and another pupil 100

shillings coin and ask them to go in a shop and buy pretend sweets (use pictures of items instead of real items). How many sweets each pupil bought? Why one has many and the other less? The same activity can be applied for comparing values of bank notes.

Additional Follow-Up or Independent Activities

Guess Game-Tail or Head? Let one pupil toss a coin in two folded hands. Ask the second, third, fourth etc. pupils in a group to guess in which hand the coin is. Open the hand without a coin to confirm who got it right or not. For those who got it right continue to guess: Is it **Head** or **Tail**? Which head of the Ex-Presidents (Mwinyi/Nyerere/Karume)? Which Tail has (rhino/antelope/lion)? Open the hand with the coin and confirm who got it right. Discuss the features of the coin tossed in the group with other pupils. Let the pupil won the game be the one to toss another coin of his/her choice. If no one won the game the first pupil continues to toss any coin of his/her choice.

Assessment: Observe if pupils are able to;

- i) Accurately identify Tanzanian coins and bank notes
- ii) Draw coins and bank notes with specific identifying characteristics
- iii) Addition and subtraction of coins and bank notes
- iv) Purchase and make change in the mock shop

CHAPTER TEN

MEASUREMENTS

This chapter deals with measurement of length, time, mass and volume. The study of measurement is important in the mathematics subject from pre-primary to high school because of the practicality and occurrence of measurement in many aspects of everyday life. The study of measurement also offers an opportunity for learning and applying other mathematics, including number operations, geometric ideas, statistical concepts, and notions of function. It highlights connections within mathematics and between mathematics and areas outside of mathematics, such as social studies, science, art, and physical education.

In fact, it is unlikely that pupils can gain a deep understanding of measurement without handling materials, making comparisons physically, and measuring with tools. Measurement concepts should grow in sophistication and breadth across the standards. However, it should be emphasized more in the elementary and middle standards than in high school.

Teacher's competences: The teacher is able to;

- a) Discuss concepts of day and night, morning, afternoon and evening using real situation, pictures and events accompanied (time measurement)
- b) Identify and demonstrate things that are near and far away (distance measurement)
- c) Demonstrate the concept of mass and how objects have similar and different mass (measurement of mass)
- d) Demonstrate the concept of volume and compare things of equal or different volumes (measurement of volume)
- e) Use non-standard measuring tools.

What is measurement?

Measurement is assignment of number to objects or events linked to time, weight, volume and length.

Why is it important?

It helps pupils understand the differences or similarities between objects and events, and helps them make sense of things in the real world.

How do I teach it in my classroom?

Teaching and learning materials: Real objects, drawings, pictures, and shadows

Example of activity 1 - Time of day: Plan the period of this lesson to start first in the morning at 8.00am. Use the real situation of that morning to let the pupils explore outside their classroom, the position of the sun and their shadows. Let them mark the length of shadow of nearby tree or flag post and go back to the classroom. Continue with the lesson by introducing the different times of day (morning, afternoon, evening, and night) through a group song or teacher/pupil dialogue that explains what we do at different times of the day. Before the ends of the period, gets them outside the classroom again and go back to see where the position of the sun and the shadow of the tree or flag-post now is. Guide the pupils to explain what they have observed. Reinforce the concepts of morning, afternoon and evening with pictures illustrating the different

times of the day. The song can be sung while showing the pupils pictures of different times of day.

Example of activity 2 - Sorting event pictures: Bring in different pictures/drawings of events that usually take place during certain times of a day. Ask the pupils randomly or in groups to sort, arrange and match pictures/drawings according to what time of day a events happen usually (e.g., morning afternoon, evening, night).

Example of activity 3 - Near and Far: Introduce the concept of near and far to the pupils by using examples. Point to a pupil at the front of the class and explain that this pupil is near to the teacher. Point to a pupil in the back of the class, and explain that this pupil is far from the teacher. Use a rope to measure the distances between the teacher and the two pupils.

Example of activity 4 - Matching near and far objects in our school: Make the class a reference point and ask pupils to compare two things that are near and far in their school environment. Ask the pupils on what non-standard tool to use to confirm their answers.

Example of activity 5 – Mass: Introduce the concept of mass by bringing things in classroom that are heavy and light. Ask pupils in random to compare two things with significant differences in weight in their hands and ask which one is heavier than the other. Use multiple examples of lifting, carrying objects etc. to reinforce the concept of mass.

Activity of activity 6: - Volume: Introduce the concept of volume by bringing in classroom different containers, such as bottles, tins and buckets of different sizes. Use liquids to demonstrate that different containers accommodate different amount of liquid. Small containers accommodate little liquid while big containers hold much liquid.

Assessment: Observe if pupils are able to;

- i) Arrange cards in sequence showing events happen from morning to evening.
- ii) Identify places or things that are near and far places in their environment.
- iii) Use real objects to identify which is heavy and light.
- iv) Fill liquid in different containers and discover which container has much and little amount of liquid.

CHAPTER ELEVEN

GEOMETRY

This chapter focused on geometry which is the visual study of shapes, sizes, patterns, and positions. It occurred in all cultures, through at least one of these five strands of human activities: building or structures like building new or repairing a house, laying out a garden, making a kite; machines or motion like using a pry-bar, riding a bike, sawing a board, swinging; navigating or star-gazing like how do I get from here to there?, using maps; art or patterns like designs, symmetries, representations and measurement as how big is it?, how far is it? Therefore, Geometry is the study of figures in a space of a given number of dimensions and of a given type and shape.

Teacher's Competences: The teacher is able to:

- a) Teach the concept of straight and round edges
- b) Involve pupils in understanding two- and three-dimensional shapes.
- c) Demonstrate the practical daily use of two- and three-dimensional shapes.

What is geometry?

The study of shapes, dimensions, size, and position

Why is it important?

It helps students to understand world is made up of different dimensions, shapes, and figures. It helps pupils to construct figures with different shapes. It provides concrete foundation for higher competence of Mathematics subject.

How do I teach it in my classroom?

Teaching and learning materials: Use different real objects, such as paper, boxes, balls, pictures/drawings, and flashcards.

Example of Activity 1 - Introduction to shapes: Introduce the concept of shapes to your pupils by showing them real objects all around us – for example, coins, tables, board, oranges, balls with different shapes. Separate the objects into those that are round and those that are flat with edges. Ask the pupils to brain storm the differences of the two groups of objects. Reinforce the concept by confirming round shapes and two-dimensional shapes by showing them the differences.

Introduce the concept of a circle by bring in the classroom real objects which are round with two sides, such as round coins, bucket lid, round pieces of paper etc. Let them observe the two side round objects and ask them to draw the shapes of the objects on ground or piece of paper. Discuss the drawings with the pupils. Reinforce the concept by asking one pupil to draw one of the round objects by tracing along its round edge on the board. Ask all pupils what do they see? Confirm the shape traced as a circle.

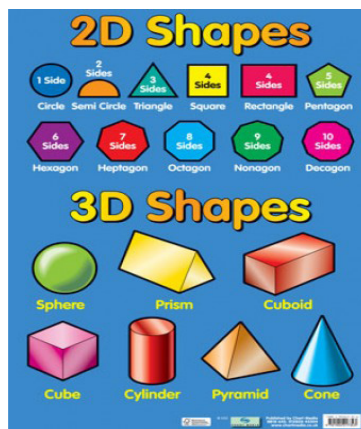
Use a piece of paper, handkerchief and paper tissue to build the concept of square, triangle and rectangle shapes. Lead the pupils to fold a paper/handkerchief/tissue provided into different shapes of triangles, square, and rectangles of different sizes. Ask the pupils to draw the folded triangle, square and rectangles on slates or piece of paper. Discuss the drawings with the pupils.

Ask all pupils what do they see? Confirm the shape traced as a triangles, square, rectangle by explaining the characteristics of these shapes.



Example of Activity 2 - Introduction to 3 Dimensional Shapes: Introduce the concept of three dimensions, by showing shapes that are and non three-dimensional and asking questions about how some shapes are alike and different.

Discuss with pupils the 3 dimensional shapes by using a bucket, ball, box, coconut, and other figures with space. Show them that a bucket, a box, coconut have space. Ask pupils to mention other figures that have spaces.



Example of Activity 3 - Differences of 2 and 3 dimension figures: Reinforce the concept of two- and three-dimensional shapes using real objects i.e. a lid and picture or drawing to illustrate a circle is 2 dimensional and use a ball/coconut to show how a sphere is 3 dimensional. Focus pupils on explaining how two and three dimensional shapes are similar and different.

Example of Activity 4 -Bring it together: Using everyday items including papers, even recycled items, the pupils should construct a three-dimensional shapes. Ask pupils to discuss what their construction is, and its shapes.

Additional Follow-Up or Independent Activities

Use a rubber band and geo-board to guide pupils to form different 2 dimensional figures e.g. triangles, squares etc.

Assessment: Observe if pupils are able to

- a) Draw two-dimensional figures, and name them correctly.
- b) Correctly match drawings and names of figures.
- c) Use three-dimensional shapes to name the shape, and discuss the characteristics of that shape correctly.

CHAPTER TWELVE

DATA GATHERING AND ANALYSIS

This chapter deals with data gathering and analysis as part of statistics. Statistics is a branch of mathematics concerned with collection, classification, analysis, and interpretation of numerical facts, for drawing inferences on the basis of their quantifiable likelihood. Statistics can interpret combined data which are too large to be intelligible by ordinary observation because such data (unlike individual quantities) tend to behave in regular and predictable manner.

Teacher competences: The teacher is able to;

- a) Develop questions/topics for simple data collection
- b) Teach the process of simple data collection
- c) Teach pupils how to analyze and represent data

What is data analysis?

Data analysis is the process of gathering, inspecting and modeling data into useful information.

Why is it important?

It allows pupils to see the similarities and differences between items/events and their inter-relationships. It also helps to make connections between numbers and real-world questions or problems.

How do I teach it in my classroom?

Teaching and learning materials: Consumable materials for data collection and representation (paper, crayon, chalk, poster paper, etc)

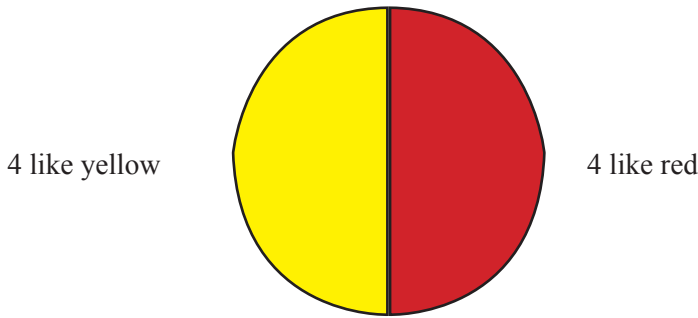
Example of Activity 1 - Introduction to data analysis: Introduce the concept of data to pupils by involving pupils in gathering, comparing and contrasting data using a simple personal data collection question.

Example: Data Gathering - Ask each pupil in the class to say which color is his/her favorite.
Data Representation - Tally the number of pupils who like similar colors and record on the board.

Data Analysis - Ask them series of questions: Which color is liked by the most pupils? Which color is liked by the least pupils?

Color	Number of pupil
Pink	0
Yellow	4
Red	4
Total pupils in a class	8

Teachers can also introduce simple graphic representations, like the pie chart below. Pupils struggle to make these graphic representations themselves, but teachers should make follow-up of this process of representing data.



Example of Activity 2 - Gathering, comparing and contrasting the data: Data Collection

- Ask all pupils to go home and count how many chickens and ducks they have at home. Ask them to record the numbers in their exercise books. **Data Representation** - Make a simple empty chart on the board, and have pupils fill in their data. **Data Analysis** – Then discuss -who has more chickens than the rest of the pupil? Who has the same number of chickens and ducks? Who has more ducks than the rest of the pupils? Who has no chicken or duck?

Pupil	Chicken	Duck
Mabula	3	9
Amina	0	0
Yohana	7	7
Joyce	10	1

Graphic Data Representations: Work with pupils to create a simple bar graph. Let one chicken be represented by one bottle tops. Ask the pupils to say how many bottle tops/chicken each pupil will have. As the pupils to arrange their bottle tops on top of each other on a single table. Let them compare who has a taller bar on the graph.



Assessment: Observe if pupils are able to

- 1) Generate simple data collection questions
- 2) Contribute data to a data collection process
- 3) Discuss simple data that is collected
- 4) Represent that data through number (charts, tallies, etc)
- 5) Contribute to graphic data representations (with guidance and modeling from the teacher)

CHAPTER THIRTEEN

NUMERACY ASSESSMENT

For effective numeracy teaching and learning in classroom, teachers need to be equipped with best approaches and knowledge on how pupils learn and master key mathematics concepts. Teachers are the main supporters in developing pupil's numeracy comprehension through involving them in a variety of problem solving activities in groups and as individuals, assigning them independent activities and observe on how each pupil responds. At this point effective assessment of pupils is a key for a teacher to be informed of individual pupil's progress and extra support needed to make pupils master the subject matter.

About the Performance Checklist

This simple numeracy performance checklist helps teachers to; Observe learning processes and activities going on in classroom and assessment of individual pupils learning outputs (products). Observation and assessment may include: What pupils are doing, showing, saying, and writing as evidence of learning path. Teachers may also conduct individual interviews and assignments of pupils and record in a simpler format indicated below to show at what stages on learning individual pupils are.

Numeracy Performance Checklist

Pupil Name:

Date:

Levels/ Performance	+ Above Level = On Level - Below Level		Beginning	Developing	Mastery	Comments
	On going Learning Process	Individual Student Products				
NUMBER, OPERATIONS, AND RELATIONSHIPS						
Number 1-9						
Counting						
Zero						
Place Value						
Addition (1 digit)						
Addition (2 digit)						
Subtract (1 digit)						
Subtract (2 digit)						
Multiplication						

Fractions						
Money Values						
Add/Subtract Money						
MEASUREMENT						
Time						
Length						
Mass						
Volume						
GEOMETRY						
2-D Shapes						
3-D Shapes						
DATA						
Topics/ Gather						
Represent/Analyze						
Summary: Total for each column						

Sample

Levels/ Performance	+ Above Level		Beginning	Developing	Mastery	Comments
	= On Level	- Below Level				
Skills Area	On going Learning Process	Individual Student Products				
NUMBER, OPERATIONS, RELATIONSHIPS						
Number 1-9	+	+			✓	Mastered
Counting	+	=			✓	Needs more practice
Zero	=	-				Continue to develop the concept
Place Value	=	-				Provide hands on place value mats

Addition (1 digit)	+	=				More addition exercises
Addition (2 digit)	=	-	✓			Provides place value exercises
Subtract (1 digit)	-	-				Conceptual understanding
Subtract (2 digit)	-	-	✓			Getting difficulty on place value
Multiplication (1 digit)	+	=			✓	Mastered similar to addition
Fractions	+	+			✓	Mastered
Money Values						Not yet addressed
Add/Subtract Money						Not yet addressed
MEASUREMENT						
Time	+	=		✓		On track for this time of year
Length	=	=			✓	In good shape with these skills
Mass	-	-	✓			Difficulty understanding the concept, more hands-on
Volume						Not yet addressed
GEOMETRY						
2-D Shapes	+	=		✓		Fine for this level
3-D Shapes	-	-	✓			Struggling to identify shapes
DATA						
Topics/ Gather	=	=		✓		Working well in group
Represent/Analyze	+	-		✓		Can not discuss data individually
Summary: Total for each column						On track but needs more hands-on experience

