TANZANIA INSTITUTE OF EDUCATION

TEACHER'S GUIDE FOR MATHEMATICS

FOR BASIC EDUCATION
STANDARD III-VII

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STANDARD III-VII

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Dr. Elia Y. K. Kibga
Acting Director General Tanzania Institute of Education

FOREWORD

Tanzania Institute of Education has prepared this guide to enable a teacher to use the Mathematics syllabus of 2016 effectively. This teacher's guide aims to enable the teacher to implement changes to the syllabus of a Mathematics subject that emphasizes building competences in teaching and learning so that the student can effectively deal with the life challenges in a surrounding environment .

Teacher, when using this guide you are advised to consider all the outlined elements in order to translate the syllabus requirements in teaching and learning activities within the classroom and outside the classroom. This guide comprises of seven main chapters, which are introductory, use of curriculum materials, teaching and learning in inclusive class as well as teaching and learning of Mathematics. Other chapters are preparing to teach, assessing learning of the lesson and worked examples in development of competences.

Therefore, the teacher is encouraged to use this guide as a precious treasure for teaching subject effectively.
Tanzania Institute of Education will appreciate to receive any relevant suggestions and opinion from teachers and other education stakeholders for improvement of the guide.

All comments, opinions and suggestions should be forwarded to the Director General, Tanzania Institute of Education.

I wish you a successful implementation of the syllabus. Provision of quality education is our responsibility.

Dr. Elia Y.K. Kibga
Acting Director General Tanzania Institute of Education

CHAPTER ONE

INTRODUCTION

Dear teacher, after reading this guide you will be expected to have better understanding of the syllabus for standard III-VI and thus be able to facilitate pupils to learn effectively. This guide is designed to be used together with the curriculum and syllabus to prepare schemes of work, lesson plans and teaching materials. This chapter consists of background, objectives, structure and importance of the guide, targeted group, how to use the teacher's guide and develop 3R's skills.

1.1 Background

Basic Education curriculum was prepared in line with the Education and Training Policy of 2014 along with collected stakeholders' views on the curriculum and teaching and learning. In furtherance of this curriculum, mathematics syllabus also has been improved in line with competence based giving it different view compared to the 2005 syllabus.

In order to have a common understanding and interpretation of the syllabus, a guide has been developed for the teachers to use during the implementation of this syllabus. This guide is also crucial for covering the knowledge gap in mathematics teaching among those with limited knowledge on the subject. So with this regard, this mathematics guide will assist the teacher in interpreting competences, activities and thus enables the teacher to plan a lesson and teach accordingly.

This guide also intends to strengthen teacher's competence in teaching Mathematics subject as to reduce or eliminate the mass failure to pupils.

Objectives of Teaching Mathematics

The main objectives of teaching mathematics subject in primary schools are: a) To develop logical thinking of the pupil.

b) To create curiosity and problems solving skills.
c) To develop basics for the use of technology, communication, reasoning and reflections.
d) To develop an ability to analyze and present information.
e) To strengthen pupil's understanding of the shapes, measurements and the respective applications in life.
f) To build confidence to apply mathematical competences in everyday life.

1.2 Objectives of this Guide

The main purpose of this guide is to enable mathematics teachers to implement effectively the competence based syllabus in teaching and learning. The specific objectives of this guide are to:

a) Analyse the curriculum and syllabus of Mathematics subject.
b) Recognize the competences of mathematics subjects.
c) Define competences, activities,and performance criteria as used in the syllabus.
d) Provide guidelines in preparations of schemes of work and lesson plans based on the Mathematics syllabus demands.
e) Describe how to develop assesment plan for pupil's learning.

1.3 Structure of the Guide

Teacher, this guide is comprised of two main parts.These are preliminary information of the guide and the main content of the guide.The preliminary information consists of cover page, title page copyrights page, table of contents, preface and acknowledgement. The main content of this guide has been divided into seven main chapters. Chapter one involves introduction, chapter two involves using curriculum materials, chapter three involves teaching and learning in an inclusive class, chapter four involves teaching and learning of Mathematics subject, chapterfive involves preparation for teaching, chapter six involves learning assessment of Mathematics subject and the last chapter seven involves examples of procedure in order to develop Mathematics competences.

1.4 The Importance of the Guide

This guide is developed for Mathematics subject teacher in primary schools in order to improve competences in teaching and to facilitate pupils to acquire the intended competences in Mathematics subject.

This guide is therefore important since it intends to enable you:

a) Implement the syllabus of Mathematics. The syllabus emphasizes learning through practical in order to acquire the skills of investigation, inquiry, record keeping and usage of mathematical information in solving various problems.
b) Emphasizes the development of pupils' competence during teaching and learning.
c) Recognize some of the teaching and learning materials and tools.
d) Get an overview of examples on teaching and learning to some chosen activities for each specific competence in Mathematics subject.
e) Use different techniques of the continuous assessment in developing pupil competence.
f) Solve various challenges in the teaching and learning process.
g) Make follow up and monitoring of implementation of curriculum.

1.5 Targeted Group

The main targeted user of this guide is a teacher of Mathematics for Standard III-VI. Other users are education quality assurers, trainers and tutors from teachers' colleges, pre-service teachers, curriculum coordinators, education officers,

examination officers, parents, authorsof books and other education stakeholders

1.6 How to Use Teacher's Guide

Teacher, in order to teach Mathematics subject successfully, you are supposed to do the following:

a) Read the guide carefully, in order to comprehend the contents and teach by considering the syllabus which emphasizes the teaching that develops competence.
b) Follow the given instructions in the teacher's guide during teaching and learning process so as to be innovative in presenting the subject.
c) Teacher, you are emphasized to put more effort in following the given suggestion in the guide, in order to teach successfully.
d) Use the guide as a tool for monitoring and evaluation of teaching and learning Mathematics subject.

1.7 Developing 3R's Skills

Reading, Writing and Arthmetics skills; 3R's skills were developed in Standard I and II similarly such skills should be strengthened in Standard III-VI. in all subjects including Mathematics. Therefore, throughout preparation and teaching of activities to be performed by the pupils in the classroom you need to consider the advancement development of such skills.

It is necessary to consider correct pronunciation of sounds, intonation, accuracy and speed in reading. You have also to ensure that all pupils have a correct interpretation of what they have read every time you give them reading tasks or word problems. On the side of writing skills, you ought to help pupils construct letters correctly and that they abide to correct principles of writing when they write their works. Moreover, you ought to develop arithmetic skills by enabling pupils to pronounce and write numbers, measurements, statistics and time correctly and state the concepts represented by those numbers. However, in Mathematics subject, pupils learn how to use the language of Mathematics in presenting ideas and they learn to read numbers from left to right or right to left in a number line or from bottom to top and top to bottom especially when reading tables or histogram graphs.

CHAPTER TWO

USING CURRICULUM TOOLS

This chapter presents the competences of using curriculum tools. It is expected that, after you have read this chapter, you will understand the Standard III-VI curriculum and use various tools that will help you in the implementation of the new curriculum of Basic Education, Standard III-VI. Once you have read this guide you will do selfevaluation by using the proposed criteria available at the end of the chapter.

2.1 Competence Based Curriculum

Curriculum is a diverse concept which can be explained in various ways. It can be perceived as a list of all what a pupil learns under school supervision and the experience which a pupil gets when undergoing his/her studies.

It is important therefore, to realize that the meaning of curriculum depends on the perception of an individual. However for the purpose of this guide, curriculum is definedas a totality of activities which happen inside and outside the school environment. Also you ought to realize that there is a curriculum which emphasizes teaching for content development: this is composed of content of various topics. Another curriculum approach is that which emphasizes on teaching for competence development. The curriculum for standard III to VI of 2016 takes this orientation.

What then are the features of a competence based curriculum? Probably, you might have thought about the following features:

a) It dwells in activities or actions based on the intended competences.
b) It focuses on professional actions or real life situations.
c) Allows flexibility in terms of time order to achieve the intended competence.
d) Measures by following criteria.
e) Awards depend on the competence demonstrated by a candidate.
f) Insists on a pupil to be a centre of learning.

Regardless of the above clarification, you are advised to refer to the curriculum document for standard III to VI for more elaboration.

2.2 Identification of Curriculum Tools

You will realize that when you implement the curriculum, you need to use various tools. Such tools include syllabus, teacher's guide, text book, supplementary book, and other related reference materials. Remind yourself on vital information about those tools by acquiring skills on the meaning, characteristics and way of translating and using such tools through reading the following section:

2.2.1 Syllabus

There is no doubt that you have been using the syllabus in the teaching and learning process. What do you understand by the concept syllabus?

A syllabus is a guide that translates the curriculum by showing what to be taught, methods of teaching and how to assess teaching and learning. The syllabus provides reflection about all the activities to be performed in the classroom. Therefore a teacher uses a syllabus as a guide in teaching the subject so as to enable pupils to develop the intended competences. The syllabus for Mathematics focuses on activities or tasks of a pupil which are the main

foundation of curriculum that builds competences. However, those activities adhere to the ability and age of a pupil in a specific level, and they are arranged in a chronological order from simple to complex. The content of the syllabus is arranged depending on the level of the class, which includes the main and specific competence, activities to be performed by the pupil, assessment criteria, pupil's level of performance, as well as number of periods for each specific competence. Please, refer to the syllabus for Mathematics for more skills about structure of the syllabus.

When using the syllabus for Mathematics in teaching and learning, it is important first to identify the specific competence expected to be developed in the pupil and the way it is translated from the main competence. Second, to identify activities to be performed by the pupil either inside or outside the classroom that are translated from the specific competences. Third, to identify the criteria and levels of pupil's performance in each proposed activity (refer to the syllabus for Mathematics).

2.2.2 Teacher's Guide

The Teacher's guide is a book that gives in depth guidance about teaching a particular subject. This guide gives you directions on how to go about in all stages from the preparation stage, teaching and the assessment of the subject.

When using this guide, it is important to refer to the syllabus so as to determine whether or not the main competence and specific competences translated in the guide are similar to those stipulated in the syllabus, the chronological flow of the activities to be performed by the pupil has been followed, and the criteria and level of assessment in the syllabus have been well interpreted. Also, it is important for teacher to refer to the syllabus so as to know whether or not the aims of the subject have been attained as anticipated in the process of teaching and learning in the teachers' guide.

Teacher's guide will help you to do the following:

i) Use syllabus precisely during lesson preparation and teaching of Mathematics subject.

ii) Prepare teaching and learning materials.

iii) Facilitate pupils to develop competence and perform activities during teaching.

iv) Involve pupils and assess their learning and evaluate yourself during and after teaching.

Relationship between a Syllabus and a Teacher's Guide

Teacher, for effective teaching you must use the subject syllabus and the teacher's guide concurrently. A syllabus bears the image of a pupil while a teacher's guide bears the image of the teacher. For example, activities to be performed by a pupil have been sub-divided into specific activities for effective

classroom learning. The syllabus has not incorporated teaching methods since some suggetions of those methods are described in the teacher's guide. Please, refer to the first chapterof this guide to get the structure of the teacher's guide.

2.2.3 Text Book

This is among the materials used in teaching and learning. It is an important tool because it provides the content that is needed for competence development. Apart from that, a text book enables a pupil to learn independently and develop the specified competences.

Features of a textbook

The major quality of a text book is that its content has been intentionally created to develop the competences specified in the syllabus and curriculum. Other features include the following:

a) It is written in a style to attract attention of the pupils.
b) It uses pictures, shapes, figures and illustrations to enhance deep understanding of the concepts to the pupils.
c) It fulfils the needs of the specific class, age and ability of the pupils.
d) The topics are sequenced in the same manner as the arrangement of competences in the syllabus.

You are not advised to use a text book as an alternative to the syllabus. Moreover, you have an opportunity to evaluate the text book given to ensure that it has the content which can enhance the development of competences in the syllabus.

Using a Text Book

As soon as you get a text book, check if the book is for the respective subject, class and if the book has been approved by the Ministry of Education, Science and Technology and written by the relevant authority (Tanzania Institute of Education) according to curriculum directives. Also, check the competences that the book contains and how they relate to the syllabus. The chapters in the text book have been arranged as they appear in the syllabus. Therefore, you are advised to identify the competences that are intended to be developed for each chapter.

This book gives a teacher an opportunity to create the content needed for developing the expected competences to pupils. Also, you are advised to use questions that will make a pupil think critically. Use these questions to prepare teaching and learning assignments. Enable pupils to discuss in groups while guided by brainstorming questions which are found in a book. These questions should focus on who? What? How? Where? Why? When? Use questions or assignments which are found within or

at the end of each section of a chapter to assess the levels of competence developed for each specific activity.

A pupil is supposed to use a text book when she/he is being guided by a teacher to read or perform certain activities before a lesson begins in order to get prior knowledge to develop competence in the lesson. Also, during the lesson pupils read content alone in pairs and investigate illustrations such as pictures, tables, shapes, figures and drawings. Moreover, she/ he answers questions or perform actions as instructed by a teacher in order to develop intended competence. The pupil will attempt questions that are found within or at the end of each chapteras well as makingreflection on the chapter in order to assess the level of competence developed in a respective chapter.

A textbook should not be used as an alternative to a syllabus. However, you are advised to evaluate a textbook in use to check on the relevancy and validity of the content and whether it is suitable for development of intended competences by a pupil.

2.2.4 Supplementary Books

A Supplementary book is a took that you can use or direct the pupils to use, for the purpose of broadening the scope of your knowledge and that of your pupils in relation to the topic or activities. This book is used alongside with a textbook or as the teacher's directives.

This book is important in the following ways:

a) It widens the teachers and pupils knowledge base.
b) It gives you extra knowledge about issues related to your subject.
c) It helps you to relate your subject with daily life experience.
d) It empowers you and enhances pupil's reading culture.
e) It builds to the pupil, the capacity to learn independently

Apart from the above mentioned importance, a supplementary book has the following qualities:

a) Its content is not limited to the competences stipulated in the syllabus alone as it is in the case of a text book
b) It can have deep information compared to what the syllabus insists
c) It can deeply relate to few competences in the syllabus
d) It should have an approval of the relevant government authority

Using Supplementary Books

The supplementary book enables the pupil to develop competences which are found in the syllabus. Also, it includes content and exercises that make pupil to learn in depth and with wide scope in order to develop high level competences. Also, the book strengthens the competence which is developed in the class by providing opportunities

for a pupil to learn more. For example, a pupil can find more case studies that build specific competence than what exists in the textbook. Also, there are additional exercises that a pupil can perform apart from those which are found in the textbook.

Teacher, you can also use supplementary books to get more descriptions of the content which will enable you to prepare activities for teaching and learning and assignments to assess pupils. These books help pupils to learn more by performing learning activities which will enable them to develop competence according to each one's ability. You are advised to consider questions that make a pupil to think critically when preparing pupils learning and assessment activities. For example, use open-ended questions when preparing tasks that develop and assess competence as instructed in the text book.

Using References

References are the other sources that can be used to broaden your understanding of Mathematics subject include brochures, atlases, dictionary, magazines, newspapers, charts, articles, television and radio programmes and websites. Nevertheless, reference books can also be used by pupils and other educational stakeholders. Writers are not obliged to prepare them in accordance with the content of the syllabus of that particular subject.

Before using references, you are advised to first identify the competence you want to develop in a pupil. Then find references that align with the particular competence. It is good to find references that are easily available in your environment. It is very hard sometimes to find references for some of the competences but there is a greater possibility of getting everything you want on the internet library. However, you should observe the quality of reference because most of the references found in the internet are not exactly in line with the Tanzanian context.

Reflection

Teacher, once you finish readingthis chapter, evaluate yourself by asking the following questions to see if you have gained the desired knowledge from the chapter:

a) What new knowledge do I think have obtained about the relationship between curriculum and the Mathematics subject syllabus?
b) What are the curriculum support materials? What is their significance?
c) What is the importance of a Teacher's Guide to me as a teacher?

CHAPTER THREE

TEACHING AND LEARNING IN AN INCLUSIVE CLASS

In this chapter you will be familiarized with the concept of inclusive education, teaching in an inclusive classroom, how to identify pupils with special needs, things to consider when teaching in an inlusive classroom, tools to be used and how to enable the pupils with special needs to learn. Therefore, by the time you finish reading this chapter, you will have acquired knowledge and skills that will enable you to teach effectively in an inclusive classroom.

3.1 Understanding the Concept of Inclusive Education

Teacher, I think you are aware that pupils differ in learning. In order the teaching and learning process to be successful in the inclusive class, a teacher should be capable enough of understanding the inclusive education, which emphasizes every learner to get an opportunity for quality education regardless their differences, in psychological and biological features.

The concept of inclusive education system demands that, every learner should participate fully in the teaching and learning process besides their differences. These differences includes:- Learners living in the difficult situations, biological and behavioural problems (behaviour dis orders). The aim of this system is to observe, reduce or eliminate completely obstacles in the learning process. In addition, this system demands that all learning centres, schools and the education system as a whole to be transparent according to the needs of all pupils.

3.2 Identifying Pupils with Special Needs

Teacher, it is important to know that pupils differ in their learning requirements. Therefore it is very important to identify various groups of pupils with special needs which might be in your class. So that to help them for purpose of learning and building intended competence.

Can you identify those groups? Teacher, the groups of pupils with special needs include:-

(a) Pupils with hearing impairments.
(b) Pupils with low vision.
(c) Slow learners.
(d) Gifted and talented pupils.
(e) Multiple disabilities.
(f) Children who are from vulnerable environment.
(g) Children with behavioural problems.
(h) Children who are psychological affected due to various reasons.

How would you identify pupils with learning difficulties? Please, read these strategies;

(a) Diagnostic assessment: This is made during the initial registration stage in order to identify if there are pupils who do not participate in learning. The aim is to deeply find the reasonswhich make the pupil not to participate in the learning and playing activities.

(b) To obtain feedback from parents or guardians about the needs of pupils/ children.

(c) To give them ordinary exercises of mentioning, reading, listening to a story being ready, to express oneself loudly, to express oneself by writing a short story, or to draw distinctions between writings and pictures.

(d) To identify them while teaching and learning, the way they act if they have heard you or not or if they fail to read letters and pronouncing them as you write them on the board.

(e) By using special diagnostic centres to discern such problems, for example to diagnose them in hospitals.

(f) A pupil responding differently to instructions given on not responding at all.

3.3 Teaching an Inclusive Class

What do you perceive the term inclusive class? This is a class which combines all pupils from different physical, economic, social and religious backgrounds. These differences have an impact to learning abilities and styles of pupils. All these pupils have the right to feel secured and safe and be assisted to accordingly.

The purpose of an inclusive class is to reduce or completely remove hurdles which weaken the teaching and learning process. It is also to make a school friendly for learning to take place among all pupils. Failure to recognize and assist those pupils with special learning needs is to deny them with their rights to education.

When preparing for teaching, you should consider that pupils differ in the way they learn. It is therefore important to use methods and techniques which engage all pupils in the learning process. You should ensure that you take into account pupils with difficulties in vision, hearingand speaking problems. Others includethose with a very low speed of learning, mentally retarded and pupils with, multiple impairments. It is equally important to recognize and assist pupils who are vulnerable or at risk. In order to have a successful teaching and learning in an inclusive class you ought to adhere to the following:

(a) Make sure you make follow up to all your pupils and understand their problems in learning.

(b) Arrange the pupils according to their background so that they can communicate and learn well according to their needs. For example, let pupils with low vision sit in front of the class. During discussion put them in a semicircle so that they can be able to see each other properly.

(c) Prepare and use teaching Aids/materials to meet the needs of the pupils. For instance, a chart with drawings or pictures should be big enough with attractive colours in order to motivate the pupils to learn.

(d) Create proper participatory method which will enable each pupil to learn successful in the classroom e.g. to lead the pupils to perform scientific experiments in different sitting plans.

(e) During the teaching and learning process use actions and signs according to the type of the leaners in the class e.g the vision learners who learn by seen, together with the practice learners who learn by discovery and walking.

(f) Make sure that the pupils with learning disabilities have extra time so that they can learn successfully the various science and technology skills.

(g) Prepare assessment techniques and methods according to your class needs. More than one technique should be applied to assess different groups. For example you can use oral questions, hand crafts as well as their ability to do scientific experiments.

(h) Set various criteria and levels to be achieved as it is instructed in the syllabus e.g. beginners, developing level, competence and above competence learners. Those with high levels "write to them" above competence. Slow learners give them "beginners".

(i) Those who do not fit in any level assess them according to their behaviour and actions.

(j) Create different activities and assessments which will suit the needs of the learners. For example you can assess them by observing their actions, behaviours, abilities in arts and sports and also in different life skills.

3.4 To Enable Pupils with Special Needs to Learn

Remember that you can identify two groups of pupils with special needs. The first group can be that of severe problem. Inform the school administration who will then inform/call parents of those pupils and advise them to take their children to the special centres for treatment. The second group is that of pupils with mild disability. With this kind of disability you need to take various measures to enable pupils learn as indicated in the case study. Now, read the following case study in order determine what you need to learn in order to overcome the teaching and learning challenges in your class.

Case study:

Mr. Basitena has been teaching Science and Technology lesson in standard three at Mabadiliko Primary School since January until the closing of school in June. The teacher had been reporting that in his class there are three naughty pupils. The first one always does a few assignments and most of time refuses to do the assignments. If he does, he does them wrongly. The second pupil pronounces and reads words wrongly. Mr. Basitena adds that, a third pupil, behaves wildly. When he picks on him

to answer a question, he stares at the teacher with a lot of tension and embarrassment. He concluded that the three pupils do not respect him and are adamant to the instructions he gives in class. He punished them several times. Mr.Basitena reported them to the school administration. He had suggested the group be disbanded before the following term.

When the school re-opened in another term in July, Mr. Basitena was transferred to another school. Ms. Upendo was assigned to be the class mistress and teach English language in that class. This teacher noticed that the three pupils were willing to learn and enjoyed learning, but there was a mystery about them. She involved fellow teachers to monitor them closely. She also involved the head of school. She disfavored the use of punishment to students as motivation for learning.

After a long study, it was observed that there were many pupils with diversified learning cases. The school administration decided to conduct a diagnostic test in all classes. The school administration involved experts specialized in leaning cases. The experts' report identified several pupils with learning problems. The problems included pupils' visual impairment, hearing (auditory) impairment, slow learners, and pupils with speaking problems. The report also had highlighted on the existence of talented and the gifted, shy and timid pupils; these are pupils who are easily frightened because of poor emotional control; fear, tension and embarrassment. When timid pupils become self-conscious they lose confidence. When the lack of confidence is overwhelming, it interferes their learning.

The report suggested for an establishment of a rescuing program. The program deliberated solutions in five areas. Each teacher was asked to report to the head of school observation of any identified problem area in their classes. Teachers were to look for:

a) Pupils with visual impairment and make them sit on the front desks in classrooms.

b) Pupils with minor auditory problems, and pair them or team them up with pupils who read for them aloud. If a teacher observes pupils with vision problems, he/she should write text in more visible print on the chalk board for their favor.

c) Pupils with problems in communication (those who think for a while before responding, those who have difficulty in pronouncing some of the words and in constructing sentences), will be teamed up with pupils who can help them.

d) Shy/fearful and timid pupils. These would be encouraged to make a try in performing a task in class and cooperate with their fellows. All pupils in classes would be educated that pupils are different; therefore they should accept differences among themselves. There should be regular changes of sitting plans

in classes to provide opportunity for pupils to learn about each other. All teachers were to ensure provision of tasks to all pupils and give each pupil a turn to perform a task in class so as to learn to be confident.

e) *Talented and gifted pupils. Teacher should identify and recognize their giftedness. Although we talk of equality in education, the fact remains that other pupils are more gifted than other. Some teachers label them nuisances, other teachers intimidate them and others keep them busy to tutor less capable pupils. A good teacher is supposed to:*

   i) *Accept them.*

   ii) *Make pupil understand they each excel and exceed differently*

   iii) *Allow them to explore, pursue and channel their gifts.*

   iv) *Help the gifted to be resilient in difficult learning tasks*

   v) *Do not intimidate them; do not give them bad names*

vi) *Provide them a room to learn intuitively. This would enlarge pupil's natural gift*

Reflection

Ask yourself about the issues which impressed you in this chapter and what other things you think you need to search for more information in order to equip yourself well in Mathematics subject lessons.

CHAPTER FOUR

TEACHING AND LEARNING OF MATHEMATICS

Chapter two gave you important information about curriculum tools in teaching and learning Mathematics subject. This chapter enables you to understand and apply the theories of learning based on conceptual understanding with the use of teaching and learning materials and methods. Also the chapter will lead you to understand how to identify and support pupils with special needs in the context of inclusion, recognize and overcome the challenges in teaching and learning the subject.

4.1 Understanding Teaching and Learning Theories that Develop Competence

Teaching and learning of Mathematics subject should focus more on developing the required competences. So it is important for the teacher to be competent in both contents and pedagogical knowledge. The process of teaching and learning has to be guided by various theories on competence based teaching and learning. It is crucial for the teacher to understand the theories behind the competences to be taught. Therefore, in order for the pupils to be able to develop the intended competences in Mathematics the teacher must guide the pupil to develop mathematical concepts necessary for comprehending mathematical vocabularies and their uses within mathematical contexts.

For example pupils learn the concepts of multiplication and division through use of concrete activities for multiplying and dividing objects before learning rules and principles underlying multiplications and divisions. Starting from concrete to abstract is important for effective learning and therefore pupils need to understand the rationale behind each mathematical rule of formula they use. Remember that the process in mathematics is vital for pupil's understanding and therefore the teacher has to guide pupils into a step-by-step problem solving processes. The mathematical processes are important in tracing pupil's thinking so that the teacher provides the assistance where needed. Mathematical learning must be linked with the social context to enable pupils apply mathematical competences in their life. With this consideration in competence development, the teacher is advised to apply a diverse range of strategies and techniques to enable pupils acquire the intended competences effectively.

Teaching and Learning that Develops Competence

The process of teaching and learning should be learner centred and focus more on performing activites. Learner centred will enable learners to develop logical thinking and creativity.

Pupils can learn in groups or pairs so that they can share knowledge and skills they have, but also they can do activities individually especially in arithmetical calculations. Also use methods of study tour to help the pupil relate the learning with

real contexts as they learn and thus make them understand how to apply the knowledge and skills they acquired in their daily lives.

You can also guide the pupils in games and songs that assist them in learning and developing competences in Mathematics. Note that, the list of methods and techniques used in teaching and learning Mathematics is almost endless. Teacher, you are expected to be creative depending on the school environment or contexts, the age and class level of the pupils and the available instructional time.

The application of learner centred depends on the appropriate application of teaching and learning aids. The teaching aids have to be effective in the sense that they convey the intended messages. Teaching aids should be focused, visible, and user friendly. The teacher should be able to improvise a variety of teaching aids from the local context, or acquire them from the community. The teacher should always keep in mind that all teaching and learning materials used in the classroom are available, friendly and applicable to pupils with special needs.

4.2 Using Techniques and Methods of Teaching and Learning

Generally, teaching and learning of Mathematics requires various methods and techniques to enable pupils to use the various mathematical tools and principles in solving mathematical problems. The teacher is advised to use a variety of methods and techniques which focus on learner centred and active learning. Techniques such as questions and answers are widely used in the teaching of Mathematics in order to involve as many pupils as possible. This technique can be used for example when doing oral quizes such as multiplication table, mental questions of addition and subtraction. In addition, pupils can learn in groups so that they can cooperate and help each other in building concept or knowledge.

However, group work approach should be used in tasks that require discussion. Some teachers use group methods to questions such as list, naming, calculating and drawing instead of Brainstorming (list, specify) individual or pair work. It is important to choose the appropriate method for each teaching and learning activity. Examples of methods and techniques for learner centred teaching and learning are shown in chapter seven.

4.3 Using Teaching and Learning Aids/ Materials

Teaching and learning Aids/materials are tools which help you to enable the pupils to develop the required competences. These are tools which a pupil uses by the guidance of the teacher in order to develop the specific competences.

a) The Characteristics of Teaching and Learning Materials/Aids

Teaching and learning materials/aids should be prepared by considering the following: They should:

(i) Correlate with the class, age and ability of the pupil.

(ii) Be safe for the pupils to interact with.

(iii) Be attractive to the pupil.
(iv) Promote creativity to pupils.
(v) Be durable.
(vi) Present clearly the intended concept.
(vii) Be large and well noticeable.

b) Things to be Considered when Choosing the Teaching and Learning Tools
There are many things to consider when choosing the teaching and learning materials/ Aids such as:.

i) Their availability in your environment.
ii) Affordability.
iii) They should be relevant to the activity and competence that is intended to be developed.
iv) They should be friendly to all pupils including those with special needs. v) They should correspond with the number of pupils in the class.

c) Teaching and Learning Materials/Aids for the Special Needs Pupils. The school with normal and special needs pupils should consider the teaching and learning materials which will suit all of them in the class. The school should ensure that, the braille machine, spectacles for the low sighted disabilities, and hearing aids for those with hearing disabilities are available for special needs pupils.

4.4 Overcoming Challenges of Teaching and Learning

There are various challenges which arise during the teaching and learning processes that a teacher can overcome. It is not easy to predict these challenges. For example, experience shows that in cities and big towns there are over crowded classes. In this context it is important to identify pupils with special needs in order to give them the care they deserve. For example in a class like this, it is important for pupils with poor vision and hearing impairment to sit in front of the class so that they can easily follow teacher's instructions and be assisted whenever need arises. In addition, slow and fast pupils should be identified in order to give them different exercises and monitor them in a different way.

The shortage of teachers is also one of the challenges in teaching and learning. Some teachers have excessive teaching load. In such situation, the teacher can provide some learning tasks for the classes without teachers to keep the learning atmosphere uninterupted.

Other challenges of teaching and learning include absenteeism of the pupils. Many periods of absenteeism breaks his/her continuity in understanding of the content taught and thus increasing the difficulty in learning. It is important to cooperate with parents to ensure that information about each pupil reaches the teacher once a pupil had a problem that could affect his

attendance of classes so that he/she can arrange for an alternative learning strategy to help a particular pupil.
There are many challenges that arise based on the contexts and classroom dynamics. The teacher should flexibly accomodate the learners needs and overcome the emerging challenges to keep the learning in progress all the time.

Case Study: Teaching Mathematics Lesson in a Class With Many Pupils with no interest of the subject

Ms. Sekela was a standard four Mathematics subject teacher at Kilimani primary school. Pupils' attendance in Mathematics lesson had been poor for a period of two months consecutively. This tendency had drawn attention of the school head. He had learned that most pupils of his school started the tendency of escaping Mathematics lesson. The situation was seemingly widening. He therefore convened a meeting with parents of all the kids of her school. Letters to invite parents to the meeting were given to the pupils to send to their parents and guardians.

Parents and guardians response was shockingly good. The school head thanked all the parents and let the chairperson of the school committee to go ahead with the meeting. Ms. Sekela was asked to address the situation to the parents, which she did with best of explanation. She went further by explaining the importance of learning Mathematics to their children, that, for example, they can in future be able to think logically, identify real life challenges and overcome them systematically. The speech enlightened the audience with details of the pros and cons of escaping Mathematics lesson. The parents appreciated it and promised to cooperate with the school in order to put end to hate of the subject. One parent even proposed such a meeting to be taking place at least twice in a semester. The proposal was supported by all the meeting.As of that day, escaping Mathematics lesson was abandoned and the pupils hate of the subject interest in learning the subject.

CHAPTER FIVE

PREPARING TO TEACH

This chapter guides you on basic issues in the preparations for teaching. Teacher, as the main facilitator in the process of learning, you are supposed to make preparation before you go to teach in the class so as the teaching and learning successful. This chapter guides you on how to prepare a scheme of work and a lesson plan.

5.1 Preparing a Scheme of Work

A schemeof work is a plan prepared for a specific period of time that enablesa 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 which includes school name teacher's name, subject, class, term and year while part two consists of a table with matrixes which containthe 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:

a) It enables a teacher to use his/her time well when implementing the syllabus.
b) It enables another teacher to take over in case of emergency.
c) 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.

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 of a pupil 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 by the pupil after participating in variouslearning activities.

b) Specific Competence

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

c) Teaching Activities

These are activities which a teacher perform 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.

d) Month

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

e) Week

In this column you are supposed to indicate 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.

f) 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.

g) Reference

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

h) 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 environment and which relate to the activity concerned. Others are, pictures, drawings, copies of case studies, chats and different publications.

i) Assessment tools

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

j) Remarks

In this column you are supposed to write the information indicating shows success or failure of teaching and learning process. Therefore, you are supposed to show the learner's level of performance in 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: Lukuledi Primary School
Teacher's Name: Maria Hassan
Class: III **Subject:** Mathematics
Term: 1 **Year:** 2016

Main Competence	Specific Competence	Teaching Activities	Month	Week	Number of periods	References	Teaching Aids/ Materials	Assessment tools	Remarks
Use the language of mathematics in presenting ideas or arguments.	Apply the concept of numbers to communicate in different context.	i) Prepare instructions for facilitating pupils in group discussion on counting up to 9999 using real objects and drawings of real objects, etc. ii) Prepare a role play instruction to facilitate pupils' pronunciation of numbers correctly.	January	2	3	Tanzania Institute of Education & Swai, F. (2007). Mathematics pupil textbook for standard . Dar-es Salaam: Ben and Company Ltd.	Real objects, drawings and objects that are in bandle and those untied objects.	Questionnaire Check list	The main activity was done correctly since pupils were able to count,read and write numbers in numerals and words up to 9999
		Prepare instructions for using number charts and cards to facilitate pupils in reading numeral numbers up to 9999.	January	2	3		Number Cards Number Charts	Check list	

General Competence	**Specific Competence**	**Teaching Activities**	**Month**	**Week**	**Number of period**	**Reference**	**Teaching tools/Aids**	**Assessment tools**	**Remarks**
		Prepare instructions for using number charts and cards on how to write numbers in digits up to 9999.	January	3	6	Tanzania Institutions of Education & Swai, F. (2007). Mathematic pupil textbook for standard grade 3. Dar-es-Salaam: Ben and Company Ltd.	Number charts in numerals, card numbers in digits	portofolio Exercises	
		repare instructions for using number charts and cards in facilitating pupils writing numbers in worlds up to 9999.	January	4	6		Number charts and cards in words	portfolio Exercises	

5.2 Preparing a Lesson Plan

After preparing a scheme of work, your next duty is to prepare a lesson plan. A lesson plan is a guideline or programme prepared by a teacher which facilitates the process of teaching and learning a lesson in a class or out of class. In the lesson plan, you have to describe how you will teach your lesson with emphasis on the teaching methods, teaching aids and time allocation.

The important things to consider while preparing a lesson plan are: a) How to introduce the lesson.

b) How to motivate pupils.

c) How to use teaching aids/materials.

d) How to design learning tasks.

e) Exercises to be given that are relevant to every pupil.

Importance of a Lesson Plan

You might ask yourself "what are the benefits of a lesson plan?". Its importance can be viewed as follows;

a) It enables you to follow the required steps in teaching the subject.

b) It provides you an opportunity to prepare teaching aids.

c) It enablesyou to plan the use of time efficiently.

d) It enables you to teach according to plan without deviation.

e) It enables another teacher to teach your lesson if you will be unable to teach.

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 40 or 80 minutes.

c) Reading text book, teachers'guide and other reference materials about the specific competence to be facilitated. Addition to that, preparelesson 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**

Main Competence: _____
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: _____

Clarifications of items of a Lesson Plan are shown below: a)
Main Competence

Main competence is a statement of what is intended to be covered in the lesson at a general level. Main competence is expected to be achieved through many lessons.

b) Specific Competence

Specific competence refers to specific knowledge, skills and attitudes which will be covered in the lesson.

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 wording 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**, which stands for features qualifying each specific activity to be; **S**pecific, **M**easurable, **A**ttainable, **R**ealistic and **T**ime 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 single period lasts 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 fulfill the goal of the respective main activity. These activities have been attached at the end of this guide.

Note:

In the Mathematics Syllabus the Pupils Activities are the ones that appear in the appendix in the Teacher's Guide for Mathematics as specific activities.

c) Learning Indicators

Specific activities are actions a pupil has to perform in every stage of the lesson in order to indicate 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' priorknowledge 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 any activity that is related to the new or previous lesson.

e) Developing Competence

Teaching and learning at this stage should focus on developing the intended specific competence to the pupil, taking into consideration that she/he is the main actor while the teacher is the facilitator.

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. You also have to guide them to apply 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

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 arised in that process so as to make improvement in the next teaching.

i) Evaluation

You have to concentrate on the reflection you made about the whole processof teaching and learning, then ask yourself about the extent to 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.

Aspect	Questions on reflection	Questions on evaluation
Activity to be done by pupil	(i) Which new things have I learned from the result of this activity? (ii) How do I know that the pupil learned as it was expected? (iii) Why were the given activities able/anable to build competence proposed?	(i) What extent was the expected activity performed? (ii) Has the pupil learned what was supposed to be learnt? (iii) Did the activities ggiven assist in the development of intended competence employed?

Teaching and learning methods	Why were the teaching and learning strategies methods successful or not successful?	Were the teaching methods employed effective?
Teaching and Learning Aids	How effective were the teaching/ learning aids?	Were the teaching and learning Aids effective?
Teaching and learning	(i) Were my explanation clear (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 how I planned? And why?
Pupils activities	(i) Was the intended standard of performance according to the instructions reached or not reached? Why? (ii) Why was the pupil able/unable to relate things she/he learnt with the daily life?	(i) What standard of performance was reached according to the instruction? (ii) Was the pupil able to relate the competence gained to their daily lives?

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 weaknesses which arised during the lesson.

j) 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 to improve future performance. Your remarks may be based on the following:

i) Comparing the specific activities and your planned activities, explainif 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 lesson.

iii) Identify new things you have learnt in the particular lesson.

iv) Explain how you will help the pupils who did not achieve 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: Koromije Primary School

Teacher's Name: Mwinyi John Masaba

Subject: Mathematics **Class:** III

Date: 16/01/2016

Period: 1 **Time:** at 2: 00 - 2: 40 am

Number of pupils					
Registered			**Attended**		
Boys	**Girls**	**Total**	**Boys**	**Girls**	**Total**
20	25	45	20	25	45

General Competence: Use the language of mathematics in presenting an ideas or arguments.

Specific Competence:

Apply the concept of numbers to communicate in different context.

Main activities: Within several periods a pupil will be able to count numbers up to 9999.

Specific Activities: Within a period of 40 minutes a pupil will be able to count numbers from 999 to 5000 correctly.

Teaching Materials: Counters, drawings of objects put into portions.

Source: Tanzania Institute of Education & Swai, F. (2007). Mathematics textbook for pupil book 3; Dar-es-Salaam: Ben and Company Ltd.pg.2.

Steps of Lesson Development

Stage	Time	Teaching Activities	Learning Activities	Indicators of Learning
Introduction	5 Min.	Facilitating pupils to revise counting items from 100 to 999 by using objects. For example:100 sticks	i) To count objects from 100-999 ii) To count numbers in groups of hundreds.	i) Numbers pronounced accurately. ii) Relate quantity of objects with numbers correctly.
Developing Competence	15 Min.	Use drawings of sticks in bandles to facilitate pupils in groups to count from 999 to 5000. Example: 1500	Counting drawings of sticks in bandle of thousands, hundreds and tens; then count single object depending on the value of the given sticks in a group.	i) Numbers pronounced accurately. ii) Relate the quantity of sticks drawn with the numbers correctly.
Consolidating Competence	15 Min.	Distribute in groups, drawings of objects in bandles and through question and answer technique ask questions related to the provided drawings.	i) Counting objects in bandles in their groups. ii) Each pupil's parcitipate in answering questions as per drawings in their respective group.	i) Counting objects correctly as per group. ii) Answering questions correctly as per drawings given.
Conclusion	5 Min.	Appoint one pupil to give a summary of the lesson.	Give summary of the lesson by listing the important things learnt.	Explain the most important things they learnt in the summary.

Reflection

- Why did the methodused in learning bring successor failure?
- Why did my explanation in the class led to the understanding understanding/ misunderstanding misunderstanding among my pupils?
- Why did the pupils participate/not participate fully in learning?

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 exceed some few minutes of the next period which belonged to a different subject.

Evaluation

The clarification and explanation I gave enabled 38 pupils out of 45 to count from 999 to 50000. 5 pupils out of 45 were at the beginning level because they failed to understand the explanations. However, pupils have managed to get skills of counting, writing, speaking, listening and reading through group discussion.

Remarks

In the next lesson I will improve group discussion method and adhere to time management. Few pupils who are at beginning level I will help and monitor their performance in respective groups.

NOTE:

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

CHAPTER SIX

ASSESSMENT OF LEARNING IN MATHEMATICS

This chapter deals with assessment of teaching and learning. You will be able to make an assessment during the whole process of developing competence to the pupil. The chapteridentifies the assessment tools and criteria in the learning which lead to competence development. Assessment is important because it enables you to improve the next teaching and learning.

6.1 The concept of Assessment

Assessment is the process of collecting evidence to measure success in the teaching and learning. It focuses more on changes and abilities of pupils achieved after doing

various activities which develops the intended competences. In mathematics, we assess the abilities of pupils to follow the proper steps in solving the problems. These abilities are due to critical and logical thinking.

Teacher, learning assessment is an important aspect in teaching and learning of a subject. In the implementation of competence based on curriculum, the emphasis is put on enabling the pupil to build an ability to think before acting and then to think about the outcome of his/her actions so that she/he can think twice on the future expectations.

Purpose of Assessment

a) To understand the academic performances, behaviors and skills development of the pupil.
b) To identify the pupils' learning problems.
c) To check the level of success for each competence,
d) To stimulate the learning interest of pupils.
e) To improve teaching and learning process.

6.2 Understanding Perspectives in Learning Assessment

There are two concepts of learning assessment which are ought to be understood so as to achieve the teaching and learning that develop the competence intended to the learner.

6.2.1 Assessment According to the Level of the Themes

Teacher, the first approach involves assessment which intends to determine the amount of content which a pupil has acquired after undergoing a learning process. It is commonly done at the end of the course. This assessment demands the pupil to know the given instructions which will enable the teacher to idenitfy the pupil's level of understanding. The assessment tool used here, are questions made of closed ends which need the pupil to respond to the instructions that indicate what he/she ought to fulfil. The teacher is supposed to identify the learning outcomes which will be assessed in specific time.

6.2.2 Assessment According to the Level of Competence

Teacher, the second approach of assessment is based on activities given to the pupils to perform so that they are assessed as opposed to content based assessment which puts more weight on terminal assessment. This one uses tools for continuous assessment. The competence based assessment is integrated to teaching and learning process. As a result, it uses activities to be performed by pupils and their abilities being assessed. Moreover, this type of assessment takes into consideration all taxonomies of learning including cognitive, psychomotor and affective domains. This implies that as a teacher you should prepare assessment tools with items which cut across all learning domains.

Competence based assessment is implemented at a certain time of the course to identify the pupils ability to perform the specified activityin relation to predetermined benchmarks. A pupil is assessed in accordance to the rubrics or benchmarks of performance. Furthermore the pupil is given an opportunity to conduct self-assessment while the teacher assess pupil's performance together with the pupils ability to assess himself/herself. The pupil participates in setting standards of performance in learning and then assesses himself/herself on the levels of performance attained. Assessment in competence based curriculum takes this perspective

Teacher, you are advised to use proper assessment tools for Mathematics subject which involve pupils in assessing their own performance and their ability to assess themselves. Pick appropriate methods and tools of assessment which are capable of showing actual level of pupils' competence development.

6.3 Assessment Tools

Teacher, these are tools which enable you to be informed of pupils' ability to perform activities intended to develop required competences. You will see that assessment tools in context of developing competences differ from those used in content based assessment. Most of these tools are used by pupils to show his/her ability of performing intended actions. You are supposed to use these tools carefully and competently since your assessment is an important tool for effective implementation of this curriculum. The following are some of the assessment tools clarified:

6.3.1 Rubrics (Table of Indicators and Grades of Performance)

These are sets of criteria and indicators of performance that inform the pupil about the way you will assess his/her performance. Use this tool when teaching to develop different competences and after finishing the lesson. It is good to describe to them, so as they can know and realise the way they will be assessed. In addition, the assessment and indicators of performance should be aligned with those in the syllabus in order to prepare assessment tools which give positive results in relation to the acquired competence. The performance indicators should be well shown to the pupils so that he/she can be able to know what he/she is supposed to do and at what extent. This makes a pupils to assess his/her work and know the level of performance he/she has attained.

An example of rubric in Mathematics subject about statistics

Assessment Criteria	Level of Performance			
	Begnning	**Average**	**Good**	**Very good**
List ten items from pictorial statistical data	Listed not more than three items from pictorial statistical data	Listed not more than six items from pictorial statistical data	Listed not more than nine items from pictorial statistical data	Listed ten or more items from pictorial statistical data

6.3.2 Checklist

This is a tool which is used to verify the presence of, or attainment of the intended specific competence. It is used to confirm the presence of things, the ability to identify things that state particular competence. This preview list will help you to get the feedback if the pupil has done well or not, and measures to be taken thereafter.

Example:

No :	Activities to be Performed by a Pupil	Level of Performance			
		Begnning	**Average**	**Good**	**Very good**
1	Arranging the items				
2	Counting the objects				
3	Specifying the number of items correctly				
4	Writing the number of items				

Descriptions of items of pupils performance criteria

a) Beginning: This is the lowest level of performing the main activityspecified. At this level a pupil manifests signs of being able to do the activity. He/she also dares to do but with major errors.

b) Average: This is the level where a pupil is able to do the activity, but cannot explain the principles of doing it and in most cases he/she needs an expert teacher to guide him/her in order to it properly.

c) Good: This is the level of performance at which the pupil can do and explain principles of doing the specified activity.

d) Very good: At this level the pupil is highly competent. He/she is able to do the activity through guiding principle and he/she can improve or create new.

6.3.3 Portfolio

This refers to a folder that is used to keep pupils' works. A teacher chooses pupils' works such as examination and tests (which are kept for a time and use for making follow-ups on pupil's progress and level of performance). The teacher should guide pupils on how to organize the portfolio according to the specified competences, so as to facilitate the placement of items during private study. The items that should be placed in the portfolio may include:

a) Photos and drawings that he/she made
b) Group work / individual work.
c) Quizes.

Criteria for Inspecting the Portfolio

Teacher, you are advised to prepare the criteria for assessing the portfolio for consistence in measuring pupil'sprogress.

6.3.4 Assessment in Mathematics Lesson

Assessment in Mathematics subject is unique because it must focus more on the process, in order to monitor how a pupil develop his/her thinking. Assessment in Mathematics involves doing exercises rather than other tools. Mathematics is a subject that needs practices of pupils through various questions, including how to solve word problems and the use of mathematical formulas. Thus, based on existing activities in syllabus, each pupil will be assessed in order to determine the level of performance. This level of perfomannce has been achieved for each specific competence during and after the lesson.

6.3.5 Assessment During Teaching and Learning Process

It should be noted that, assessment takes place at all time of learning and not only at the end of each session as it is believed by some teachers. In mathematics, almost every activity performed by a pupil in a class is assessed or it should be assessed. That is why, observation is a technique recommended to be done all the time during teaching and learning so as to get quick and timely feedback. A teacher should also use the methods of inquiry when pupils are doing exercise, class work, quiz and other activities, in order to identify trends of learning and getting the required feedback urgently and timely. Check list and portfolio are tools used along with this approach.

CHAPTER SEVEN

MODEL LESSONS FOR COMPETENCE DEVELOPMENT

This chapter explains some examples of teaching and learning process for selected competences in Mathematics. This guide contains lesson models of selected main

activities with their main and specific competences. Therefore, it is expected that from these examples, you will be able to demonstrate other activities which have not discussed in this guide.

7.1 Main Competence: Use the Language of Mathematics in Presenting Ideas or Arguments

This main competence will help a pupil to understand mathematical language and the way to communicate with others especially in various mathematical activities. In developing main compentence using mathematical language, a teacher will;

a) Guide pupils develop the concept of numbers and practically apply statistical skills in presenting different data or information.
b) Use different techniques and teaching materials in teaching and learning process,
c) Ensure that a pupil gets enough time to reason and respond.

This competence can be developed by the following three specific competences: a) Apply the concept of numbers to communicate in different context.

b) Apply statistical skills in presenting various information.
c) Apply algebraic skills to solve problems in real life context.

7.1.1 Specific Competence 1: Apply the Concept of Numbers for Communication in Different Contexts.

A number is an arithmetic value expressed in words and symbols. It is used to represent the quantity of objects. Although standard three up to six pupils already have the concept of numbers, but this concept is abstract therefore, it is important to always include the concept of number with real objects. In dealing with concept of numbers for grade III to VI, the Arabic and roman numbers will be considered. Activities which form this specific competence are: a) Counting Objects

b) Reading Numbers
c) Writing Numbers
d) Identifying Place Values of Numbers
e) Reading Fraction
f) Writing Fraction
g) Reading Roman Numbers
h) Writing Roman Numbers
i) Mention the application of Roman Numbers.

Teacher's Competence

Teacher, in order to be able to facilitate on learning how to apply the concept of number in communicating in various context, you are supposed to have the following qualities:

i) Enough knowledge on concept of numbers.

ii) Competence in using different participatory methods and techniques of teaching and learning in order to help all the pupils including those with special needs to participate effectively.
iii) Understanding on how to include cross-cutting issues which are used to explain various numbers for example Arabic and Roman numbers.
iv) Ability in guiding the pupils to divide objects in parts or groups in order to make them understand the concept of fraction and how to present fraction by using numbers.

Note

Number is one of the important communication methods. It enables pupil to think clearly so as to help her/him to reason on the information they want to present and to select a correct methodof presenting specific information. Therefore, facilitating a pupil on understanding the concept of number gives her/him ability to translate texts involving number so as to apply them in communication. Also numbers are used to explain different information specifically those concerning amountof objects and to present them by using symbols.

Things to Consider

i) Identify pupils' understanding on the concept of numbers.
ii) Make sure that you have enough different teaching and learning aids according to your classroom needs.
iii) Identify different learning ability in pupils in order to help those children with special needs.
iv) Make sure that the pupils are competent in using vocabulary and correct pronounciation of numbers.
v) Make sure pupils relate teh particular number with the objects they count correctly. vi) Pupils should realize that in real life situation we do not count number but objects.

Teaching and Learning Concept of a Number

Since the concept of number is abstract, then its teaching must aim at helping a pupil to get rid of it by associating it with the real life. A teacher should use techniques and participatory methods by comparing the concept of numbers with real life.

Main Activity: Numbers Identification

Specific Activity 1: Counting things or objects

Things to Consider: Remember that, by this time pupils have the knowledge of counting things or objects up to nine hundred ninety nine (999). Therefore, this stage is his/her extension of counting objects.

The use of abacus and number tray can help in teaching to count more objects in this stage. It is important however to use groups in counting objects, since it is not easy to have many things or objects under normal circumstances.

Teaching and Learning Techniques for counting activity can be done by pupils in groups or individual individually. The textbooks have various enough pictures in order for the pupils to be able to count and write numbers which relate the numbers of those objects. Use more and enough exercises for groups and individuals to make sure that each pupil participate in counting activities.

Teaching Materials: Different counters, real objects (bottle-tops and bandle of sticks) chart, abacus and number tray.

How to teach

In counting objects between 1000 up to 9999, facilitate the pupil in the following: i) Count by pronouncing from 990 up to 1110 by using real objects, ii) Develop her/his vocabulary of numbers from thousand and above iii) Pronounce numbers by order as follows 10, 20, 30,… 80, 90, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000; 3000, 4000, 5000, 6000, 7000, 8000, 9000.

iv) Do an exercise of pronouncing numbers from 1000 up to 1200, 1200 up to 2000, ……

v) Follow up pronounciation of numbers for each individual pupil.

vi) Help those who skip or unable to count. vii) Use textbook to provide exercises of counting objects which available in it.

Assessment

One of the appropriate methods used to asses a pupil if he/she mastered counting is investigation. Find out the ability of every pupil in counting objects throughout the period and when you ask the question by using checklist. Use classroom exercises and those available in their textbooks. Assist a pupil who is unable to count.

Feedback

Since the pupils learnt to count in standard I and II, in this stage counting will be the extension activity hence a teacher needs to consider development of counting vocabularies.

Specific Activity 2: Reading numbers

We have seen how to count objects in the above first activity. The question is how can you help Standard III to VI pupils? In reading numbers we must focus on place of numbers. The limit of numbers in Standard II was 999 means hundreds. According to the above example, the limit of numbers for Standard III is 1000 up to 9999 and 99999 for Standard IV. Basing on this, reading of numbers must be done focusing on ones, tens, hundreds and thousands. Can you guide the pupils to read 6789?

Teaching and Learning Techniques

Reading activity is supposed to be done by each individual pupil. Teacher is responsible for ensuring that each pupil is able to read accurately.

Teaching Materials: Number cards and chart of numbers.

How to teach

Specific activity 3: Read the following number 6789.

i) Guide the pupils to clarify a number 6789 that 6789 = 6000 + 700 + 80 + 9 ii) Explain to them that, reading this numbers are equivalent to pronouncing it in place order of each digit such as thousands, hundreds, tens and ones.

iii) Demonstrate by reading; six thousand seven hundred eighty nine. The emphasis is in readingnumber by correct pronounciation and identifies the position of each digit in a number.

iv) Provide pupils with an exercise of numbers in groups then individually.

v) Make follow up of each group and select some pupils who have problems in reading.

Specific Activity 4: Read numbers which have effects of mother tongue.

How to teach

i) Identify numbers which have ambiguous pronounciations that have the effect of mothertongue such as 6984, 1437, 84362 and 31584.

ii) Guide the pupils to read those numbers and every pupil has to read at least eight numbers.

iii) Identify pupils who have the problems or great needs in reading those numbers. iv) Guide them to practice reading those numbers correctly.

v) Discuss with pupils how to read those numbers correctly.

vi) Prepare number cards of ambiguous numbers.

vii) Use number cards to enable the pupils to read different numbers individualy by individually in classroom.

Feedback

j) 6984 this number is read–Six thousand nine hundred eighty four.

ii) 1437 this number is read –One thousand four hundred thirty seven

iii) 84362 this number is read –Eighty four thousand three hundred sixty two.

iv) 31584 this number is read –Thirtyone thousand five hundred eighty four.

Learning Assessment

In assessing if the pupils were able to read numbers, write different numbers on cards or blackboard then select some pupils to read those numbers. Examine how many pupils have pronounced simple numbers, and those with reading and grammatical

challenges. Make sure you assist those who have a problem in reading. If a pupil has read a quarter of a given numbers he/she needs more assistance, so take time to help him/her. If pupil has read at least a half, you can find other pupil to help him/ her. The pupil who got three quarter must repeat those areas which were difficult to him/her until managed to read correctly and pupil who has read numbers correctly, give him/her more difficult numbers and ask him/her to help others. If whole class can read less than a half of a given numbers change the teaching techniques and repeat the whole lesson.

Specific Activity 5: Writing numbers

There two ways of writing numbers; writing numbers in words and numerals. Writing numbers in words, a pupil must use specific grammatical language and writing numbers in numerals a pupil must use mathematical symbols means that Arabic digits by focusing on each digit place.

Teaching and Learning Techniques

In teaching the concept of writing numbers, you can employ different methods such as Think-pair-share, questions and answers, brainstorming, group discussions or pupil's individual work.

Teaching Materials: Numbers cards and charts of numbers. **Specific Activity 6:** Write the following numbers in words

i) 7584 ii) 30201

How to teach

i) Guide the pupils to clarify a number in a long form, for example 7584 = 7000 + 500 + 80+ 4, ii) Ask the pupils to read a number again by using the clarifications.

iii) Tell them to read specific numbers correctly by clarifying

iv) Give them different numbers in groups and ask them to write by words for the purpose of clarifying.

v) Repeat the activityof writing numbers without clarifications.

vi) Identify pupils who failed to do the exercise and assist them.

vii) Identify fast learners and give them more exercises while you assist those couold not perform the task.

viii) Give the fast learners opportunity to present their work infront of the class.

Feedback

i) 7584 – Written and read as seven thousand five hundred eighty four

ii) 30201 – Thirty thousand two hundred and one.

Specific Activity 7: Write the following numbers in numerals.

a) Three thousand four hundred thirty six.

b) Eighty two thousand nine hundred thirty seven

How to teach

i) First guide the pupils to write those numbers in long form, for example 3000 + 400 + 80 + 6

ii) Ask them to write those numbers in short form

iii) Ask them to read it.

iv) Provide them more exercises

v) Observe who were able to write correctly and those who have problems.

vi) Give more exercises to those who were able to write correctly and help those who have problems.

Feedback

h) Three thousand four hundred eighty six – 3486

i)Eighty two thousand nine hundred thirty seven – 82937

Things to Consider

We have seen that there is a problem of reading some numbers because of the effect of mother tongue, so make sure you solve that problem of inability to read a number as it is written. In most cases, pupils may read differently but write correctly.

Learning Assessment

Use check list to identify how many pupils have written correctly and how many pupils failed. Test the extent in which they failed and help them. Organize the pupils who performed well and those who performed three quarters of the given exercises.

Main Activity 2: Describe the Place Value of Numbers

A teacher should remember that, a pupil learnt place value of numbers up to 999 in standard II, so this is an extension of 999 to 1000 ; a step further. The limit for standard III and IV will be from number 1000 up to 9999 and add one step of place value for standard III and one step for standard IV (10000 up to 99999 for standard IV)

Teaching and Learning Techniques

In teaching place value of numbers you can use participatory, group discussion and pupil's individual work.

Teaching Materials: Abacus, number tray, rope/thread
Specific Activity 1: Identfying place value of number 1000

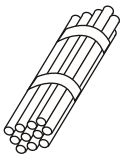
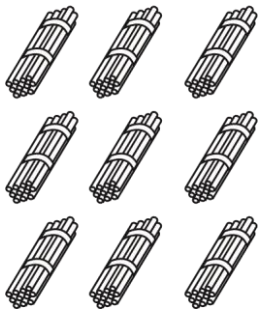
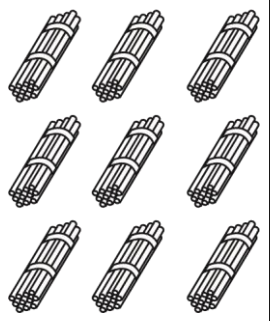
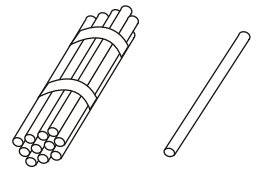
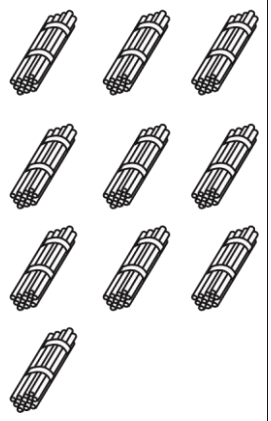
How to teach

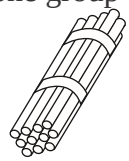
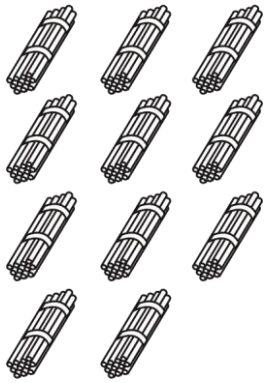
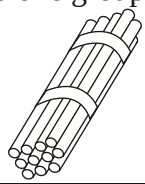
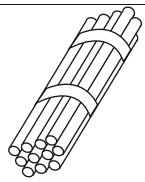
i) Start by providing activities in groups then individually.
ii) One group does some questions and present. Other groups make contribution.
iii) Observe each pupil's participation.
iv) After the presentation of some groups, provide brainstorming activity by reading numbers and mention the place values such as tens, thousands, hundreds or ones.
v) During mentioning make sure the pupils bowed, then when you mention tens, observe who say "correct" and who say "incorrect."
vi) Match with the correct position you have mentioned.

Feedback

Number 999 is the same as nine groups of hundred sticks, nine groups of ten sticks and single nine sticks. From 999 to 1000 is the same as adding of one stick in nine groups of hundred sticks, nine groups of ten sticks and nine sticks. Addition of one stick makes nine sticks to be ten so as to get one group.

Move the group into other groups which have ten sticks to get a group ten sticks. Ten groups with ten sticks make one group with hundred sticks; close it and put into groups with hundred sticks and make ten groups of hundred sticks. Ten groups of hundred sticks each, makes one group of sticks, this group represents a number 1000 which is read as one thousand. These explanations can be end expressed through the following diagram (example of number tray).

Thousands	Hundreds	tens	ones
			
			Add then tie and put one group into tens. 
			
Thousands	Hundreds	tens	ones

		Tie these groups into one group 	
	 Tie these groups into one group. 		
			
1	0	0	0

Those numbers which appears in this area will have thousands, hundreds, tens and ones. Therefore one thousand is equal to; thousands= 1, hundreds =0, tens = 0 and ones = 0. Remember this even in ten thousands.

Specific Activity 2: Write the place value in the following numbers

a) Three thousand three hundred and thirty five

b) Twelve thousand four hundred eighty

c) 5008

d) 84791

Example: In this number 57698 number 8 is ones 9 is tens 6 is hundreds 7 is thousands and 5 is ten thousands.

You can read one of the digits in number 57698 and ask them; is 7 in tens? Observe how many pupils get right. Make sure that, you correct those who did mistake.

Feedback

a) Three thousand three hundred thirty five has thousands = 3, hundreds=3, tens=3 and ones 5. As it can be seen in the table below:

Thousands	Hundreds	Tens	Ones
3	3	3	5

ndred eighty has

b)

hundres=4, tens

=8 and ones=0

Ten thousands	Thousands	Hundreds	Tens	Ones
1	2	4	8	0

c) 5008

Thousands	Hundreds	Tens	Ones
5	0	0	8

d) 84791

Ten thousands	Thousands	Thousands	Tens	Ones
8	4	7	9	1

Learning Assessment

i. Provide an exercise at least four questions which is divisible by four.

ii. By using standards of performance observe how many pupils were able to identify thousands in grade three and ten thousands in grade IV correctly.

iii. Assist those pupils who got at least quarter of all given questions.

iv. For those who got a half and three quarter of the given questions let them assist each other.

Main Activity 3: Identification of Fractions

Specific Activity 1: Dividing real objects in pieces or equal groups

Dividing objects in groups is the same as to separate an object in equal parts. Objects which are divided are among all objects in one entire group. This can be the initial process of explaining the concept of fraction. Likewise dividing objects is the easy way of explaining division operation.

Teaching and Learning Technique

You can use demonstration, group work and individual work.

Teaching Materials: Counters, cards, papers, fruits, knife, etc.

Example: Dividing countable things

How to teach

i) Ask the pupils to bring objects which are alike, countable and divisible in equal groups.

ii) A number of objects must be even number such as 2, 4, 6, 8, 10, 12.....

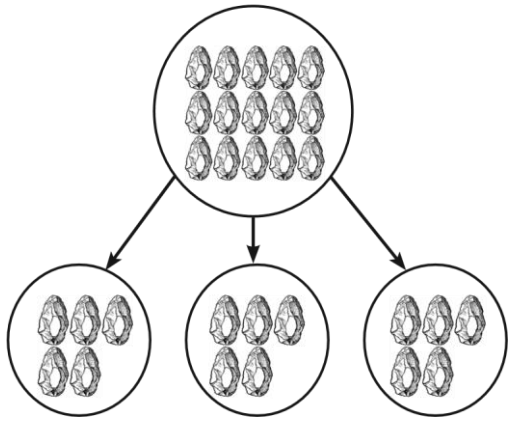
iii) Group the pupils then each group to put together their items then ask them to count.

iv) Write the number of counters of each group and observe that numbers if can be divided by 2, 3, 4 and 5.

v) If there is a group with counters which can be divided by 5 tell them to divide the counters in those groups equally.

vi) Do the same in (iv) in groups with counters divisible by 4, 3 and 2.

vii) Ask them for the result.



Feedback

To divide a single item into equal items is the same as setting it into equal parts.For example if you have 15 stones and a child who can carry only five stone at a time, so he/she will divide 15 stones into 3 groups of five stones. Each group of 5 stones is the part of all 15 stones. There are three groups of five stones, one group is a part of those three groups in a complete object and therefore it is called one third.

Things to Consider

Do not explain indepth because this method is also used to explain the concept of division.

Specific Activity 2: Divide real objects into fraction.

How to teach

i) Take a part of a paper or manila papers and divide it into half parts.

ii) Ask pupils to divide a paper into two equal parts. iii) Ask them what a fraction of a given paper is obtained.

iv) Ask them again to divide each fractions into two equal parts v) Ask them what fraction of the parts of the whole object.

Feedback

j)When you divide one object into two equal parts you will get two halves.

iii) When you divide one object into four equal parts you will get four quarters.

iii) When you divide one object into three equal parts you will get three one third.

Things to Consider

i) In this section you were developing and strengthening the concept of fractions and its vocabularies.

ii) Make sure each pupil participate effectively.

Specific Activity 3: Divide real objects into fractions

How to teach

a) Ask the pupils to bring fruits such as tomatoes, or oranges

b) In groups illustrate how to cut fruits into equal fraction.

c) Ask them what fraction is of each piece of the complete fruit.

d) Divide one fruit into 3 parts, another fruit into 4, 6 and 8

e) Ask various questions on how to get one over eight, one over six and one third.

f) Continue asking questions in order to get three quarters and two third.

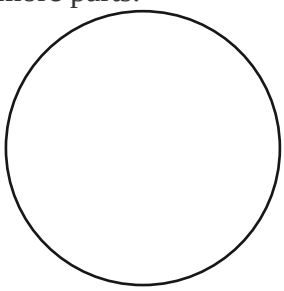
Feedback

a) If the pupils cut six equal pieces from the fruit, therefore each piece is a fraction of the six pieces.

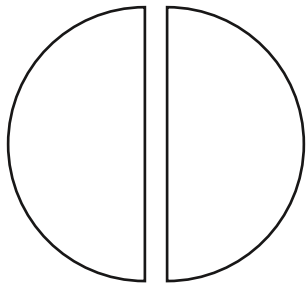
b) Repeat this exercise by asking the pupils to arrange the objects into groups and divide those groups into three, four, and six groups with equal number of objects.

c) Give pupils cards, paper and fruits in order to divide into three, four, five or

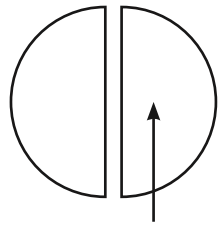
more parts.



Whole object



Piece Piece



One piece out of two pieces **Learning**

Assessment

i) By using rubrics observe how pupils have managed to divide things into groups.

ii) Assist by repeating the exercise for those who did not manage to divide pieces or identify fraction correctly.

iii) Use more drawings on the board or manila to test pupils in identifying fraction.

Specific Activity 4: Reading and writing fractions

How to teach

By using demonstration;

k)

l)Divide a fruit into two equal pieces

ii) Display those pieces to the pupils.

iii) Ask them, what part of the fruit does each piece represent?

iv) Ask how this number can be written

v) Write the number on the board

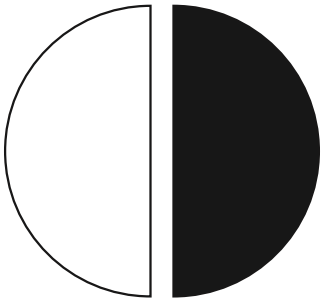
vi) Then display the number as it is written on the board and on the number card.

vii) Guide the pupils to write and read fractions (Example one third, quarter, or one over five, half).

Feedback

We got two pieces when we divided the fruit into two equal pieces. Therefore, there are two pieces into one fruit and each piece is the part of the fruit. If we take one piece it is the same as another piece among the two pieces.

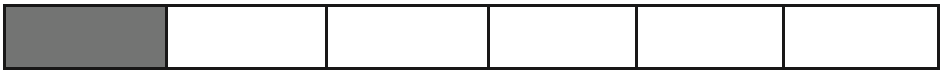
One piece out of two is written as ½



The shaded region is one of the two pieces and written as ½ and read as one over two or a half.

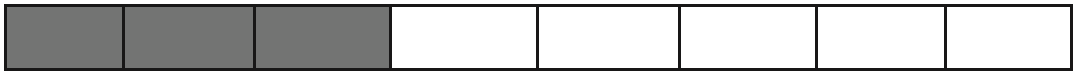
Example 1: Read a shaded part.

a)



Shaded region is a piece out of six pieces of the whole object and written as 1/6 and read as one over six.

b)



Shaded region is three parts out of eight parts of the whole object and written as ⅜ and read as three over eight. In a fraction, a number above is called numerator and the one below is a denominator. Therefore, in ⅜; 3 is numerator and 8 is denominator.

Learning Assessment

Observe if pupils were able:

i. To write a fraction after dividing objects.

ii. To identify that all pieces of the whole object represent a denominator. iii. The piece taken represent numerator.

Main Activity 4: Using Roman Numbers

Roman numbers are signs representing a number of items different from Arabic signs which the pupils were using in grade I and II. Although this concept will seem to be new for grade IV pupils but it will not erode their understanding of the concept of number. To teach the pupils concept of Roman numbers is better to relate it with Arabic which they are familiar with.

Teaching and Learning Techniques

You can use demonstration, brainstorming and questions and answers

Teaching Materials: Cards with Roman number, cards with mixed numbers of Roman and Arabic, flip chart, glue, papers, etc.

Specific Activity 1: Reading Roman numbers

How to teach

a) Prepare posters which show relationship of Roman and Arabic numbers from 1 up to 50.
b) Group the numbers in a group of 1-10, 11-20, 21-50.
c) Provide cards of Roman numbers from I up to L.
d) Start by writing Arabic numbers from I-10.
e) Ask the pupils to read those numbers.
f) Write Roman numbers parallel with Arabic numbers.
g) Ask the pupils to read Roman numbers while they identifying those numbers.
h) Write numbers 11-50 in Roman numbers parallel with Arabic numbers then ask the pupils to read those numbers while identifying Roman numbers.
i) Put together cards with Roman numbers and cards with identifying Arabic numbers let pupils relate and read a card with roman number with that with arabic number.
j) While attachingArabic numbers on a wall, ask the pupils to select a card with Roman numbers, read and attach it on wall parallel with a corresponding Arabic number.

Feedback

Arabic numbers	Roman numbers	Arabic numbers	Roman numbers	Arabic numbers	Roman numbers	Arabic numbers	Roman numbers	Arabic numbers	Roma numbe
1	I	11	XI	21	XXI	31	XXXI	41	XLI
2	II	12	XII	22	XXII	32	XXXII	42	XLI
3	III	13	XIII	23	XXIII	33	XXXIII	43	XLII
4	IV	14	XIV	24	XXIV	34	XXXIV	44	XLI
5	V	15	XV	25	XXV	35	XXXV	45	XLV
6	VI	16	XVI	26	XXVI	36	XXXVI	46	XLV
7	VII	17	XVII	27	XXVII	37	XXXVII	47	XLV
8	VIII	18	XVIII	28	XXVIII	38	XXXVIII	48	XLV
9	IX	19	XIX	29	XXIX	39	XXXIX	49	XLI
10	X	20	XX	30	XXX	40	XL	50	L

Specific activity 2: Writing Roman Numbers How to teach

a) By the use of demonstration technique, guide the pupils on the process of writing Roman numbers.
b) Guide them to write Roman numbers I – X.
c) Then, X- XX.
d) Finally combine I-L.

e) Mention numbers without order then ask the pupils to write those Roman numbers parallel with Arabic numbers.
f) Repeat the process three times in different days.

Learning Assessment
Observe if the pupils are able to:
a) Read Roman numbers
b) Identify Roman numbers
c) Match Roman and Arabic numbers

Specific Activity 3: Mention the uses of Roman numbers

Teaching and Learning Techniques
You can use questions and answers technique in teaching Roman numbers **Materials:** Watches or clocks, Card of Roman numbers, preliminary pages of books which have Roman numbers.

How to teach
a) By using Brainstorming or questions and answers method, ask the pupils the uses of Roman numbers.
b) Identify their understanding through their answers
c) Compare with correct answers.

Feedback
Roman numbers are used in a)
clock/watch
b) Preliminary pages of books
c) Listing or mention the quantity of objects or as numbering format.

Example: Mention the place value of each of the following in 602
I 6 = hundreds
II 0 = Tens
III 2 = Ones

7.1.2 Specific competence 2: Apply statistical skills in presenting various information

The process of presenting various information (for example information about HIV and AIDS, gender and environmental issues) by using different graphs,for example, pictorial graphs, bar graph and pie charts is among of the uses of statistical skills. In learning this competence, standard III and IV pupils will learn pictorial and bar graphs in order to develop knowledge and skills in presenting information by using pictures. Standard three pupils will use statistics skills to present information, after doing the following activities:
a) Reading and interpreting pictorial statistics.

b) Writing number of objects from pictorial statistics.
c) Collecting and recording data
d) Drawing pictorial statistics by using presented information.
e) Calculating average by using different data.
f) Drawing and interpreting pie charts
g) Interpreting bar graphs.

Standard V and VI pupils can find average, drawing and interpreting pie charts. A teacher who develops this specific competence must have:

a) Enough knowledge in statistics and their representation
b) Ability to use different methods and techniques of teaching and learning in order to help the pupils develop tis competence.
c) Creativity in teaching by using their context.

Importance of Using Statistics Skills in Presenting Various Informations

Presenting information by using statistical skills enables to:

a) Large amount of information (data) is shortened by using graph (picture) carrying the same information.
b) Acquire knowledge of presenting information by using various simple methods.
c) Identify life challenges and ways to overcome.
d) Understanding environment and use it in learning.
e) Interpret graphs correctly.

Main activity: Using statistics

Specific Activity 1: Reading and interpreting pictorial graph

a) Things to consider during teaching and learning of reading and interpreting pictorial graph:

i) To collect various informations (data). Guide the pupils to prepare information about environment, road safety, HIV and AIDS, gender, and other important information.
ii) Teacher will present those informations in pictorial graph
iii) Teacher will guide them to read pictorial graph.
iv) Finally, interpreting pictorial graph correctly.
v) Teaching and learning of reading and interpreting statistical data.

Teaching and Learning Technique

Use various participatory techniques/methods in making teaching and learning pictorial graph to be done effectively.

Teaching Materials: Various real objects for example, pencils, exercise books, books, trees, bottle tops, coin, etc. pictures of various objects and texts of various informations.

How to teach

i) Guide the pupils to identify and list some of the identical real objects available in their environment for example; pencils, desks, trees, bottle tops, coins, (also, texts of various informations can be used)

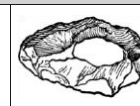
iii) Present those data by using pictorial graph.

iv) Ask the pupils to read pictorial graph.

v) Use the questions to guide the pupils to interprete pictorial graph.

For example:

A teacher was preparing flower garden by using stones. So, he/she chose some pupils to collect stones in order to build it. Mary, Abdul, Rozi and James collected stones as the following pictorial graph shown:

NAME OF THE PUPILS	STONES				
MARY					
ABDUL					
ROZI					
JAMES					

Pupils should read and interpret this graph, some questions to guide them in reading and interpreting the graph are:

a) How many stones did every pupil collect?

b) Who collected many stones than others?

c) Who collected few stones than others?

d) How many more stones did James collect than Rozi?

Learning Assessment

Assessment should consider more on pupils' activities in learning to read and interpreting pictorial graph. Assess if the pupil can read and interprete pictorial graph correctly and find the techniques to help those who failed.

Specific Activity 2: Writing number of objects from pictorial statistics**.**

a) Point to consider during teaching and learning of writing number of objects from pictorial graphs

i) After the pupil has read and interpreted pictorial graph, you need to guide her/him in writing number of objects from pictorial graph.

ii) If they will require to draw, select simple diagram

iv) Draw identical diagrams which will represent everything.

v) Make equal spaces between the diagrams.

v) Mention objects from pictorial graph. Guide the pupils to mention number of objects represented in a pictorial graph.

vi) Writing correctly the number of objects from pictorial graph.

b) Teaching and Learning of Writing Number of Objects from Pictorial Graph.

Involve the pupils in writing number of objects represented in pictorial graph. Use different techniques/methods in participating pupils in writing correctly. Pupils can do individually or in group.

Teaching Materials: Pictorial graph, pencils, manila papers etc. **How to teach**

Remember that pupils have read and interpreted graphs. Therefore, guide the pupils to do the following:

a) Mention objects and its total numbers seen in pictorial graph.

b) Count number of the objects for example pictorial graph showing trees planted by each class correctly.

c) Lastly, ask them to write total number.

Pictorial graph showing trees planted by each class

Class	Trees
II	
III	
IV	
V	

Guide the pupils to mention how many trees planted by each class? Pupils have to write those objects correctly and finally write their total numbers.

Remember that the questions used during interpreting pictorial graph can be used to ask the pupils to answer in written form.

Learning Assessment

i) Asses on how pupils can write numbers of objects from pictorial graph. Assessment must consider more the correct written data (objects and its total number).

ii) Find different techniques/methods of assisting those who failed.

iii) After drawing they need to write the name of the pictures they have drawn and other suitable information for the specific graph.

a) Teaching and learning of drawing pictorial graph by using information presented.

Guide the pupils to draw pictorial graph by using the presented informations. Use different techniques/methods in making the pupils participate in drawing correctly and easly. Give the pupils enough time, to draw pictorial graph in group and individually.

Teaching Materials: Real objects, texts with different data, pencils, manila papers, etc.

How to teach

a) Guide the pupils to collect and record different data from their environment/ out of their environment.

b) Let them identify, correct objects needed in writing in the graph.

c) Guide them to draw the shape of the specific graph which will be used in presenting that information correctly.

d) Tell the pupils to write the names and other required information in the graph.

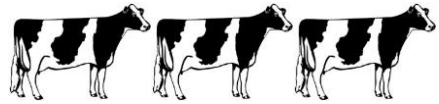
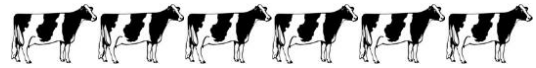
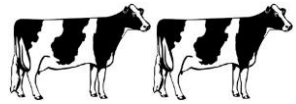
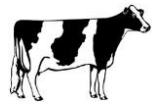
e) Guide the pupils to draw pictures in that graph correctly without changing the meaning of information.

f) Guide them to prove whether all the required information in the graph have been written correctly.

For example: Mzee Malingumu has four children; Sophy, Mosse, Halima and James and each child has a cow. The pictorial graph represents this information

PICTORIAL GRAPH TO REPRESENTING COWS OF FOUR CHILDREN

CHILD'S NAME	COWS

SOFIA	
MUSSA	
HALIMA	
JAMES	

a) Guide the pupils to identify and record data available in that information. The digit before the name represents the number of its cows. **Data:** Sophy 3, Mosse 6, Halima 2 and James 1.

b) Guide them to identify information needed in the graph such as title of that graph, four names of the children and the pictures of cows.

c) Guide the pupils to understand the information needed in that graph; that is the names of children and the pictuers of cows.

d) Finally guide the pupils to verify whether all important information have been written in the graph.

Specific Activity 3: Drawing pictorial statistics

Things to consider when drawing pictorial statistics

Standard IV pupils will learn to draw pictorial graph by using the presented information (data). Points to consider when teaching and learning drawing pictorial picture are:

i) To collect and record data. Guide the pupils to collect the correct data and record them.

ii) Guide them to draw pictures related to the data correctly.

Learning Assessment

Assessment should focus more on how pupils are doing in learning to draw pictorial graph. Asses step by step if a pupil is able to collect and record data and draw pictorial graph correctly, also find the techniques to help the pupils who unable to do.

7.1.3 Specific competence 3: Apply Algebraic Skills to Solve Problems in Real Life

Standard V and VI pupils are able to apply algebric skills after performing the following:

a) Adding and substracting terms.

b) Solve simple algebraic equations.

The importance of using algebraic skills:

h) Enhancc critical thinking.

ii) Apply the skills in daily life.

Specific Activity 1: Addition and subtraction of terms

Things to Consider

When teaching and learning addition and subtraction of terms, you should consider the following:

i)Collection of like items

iii) Collection of unlike items

iii) Definition of vocabulary used

Teaching and Learning

Use different techniques to guide pupils in adding and subtracting expressions with examples of like and unlike items.

Teaching Materials: Real things such as exercise books, pens, pebble, fruits.

How to teach

i) Guide pupils to understand the meaning of Coefficient, Variable and Term. In 4 y; Term=(4 y),(4)=Coefficient,(y)=Variable

ii) Guide them to add or subtract like terms and give the answer in variable iii

Pupils should give correct answer. For example 3y + 2y = 5y or 10p – p= 9p.

iv) Insist pupils that unlike terms are not added or subtracted together and that they remain as they are. For example: 6k + 2x = 6k + 2x or 7w – 4m = 7w - 4m.

v) Give pupils more exercises involving terms.

Learning Assesment

Find out if pupils are able to add and subtract like and unlike terms. Use various techniques to help those who failed to understand

Specific Activity 2: Solving simple algebraic equations

Teaching and Learning Technique You can use demonstration technique.

Teaching Materials: Beam balance

Things to consider when teaching and learning simple algebraic equations:

i) Add or subtract a number or the same term to both sides of the equation ii) Multiply or divide a number or the same term to both sides of the equation

How to teach

a) Start with simple terms using the concept of boxes, **Example**:
□ + 3 = 5 which is the same as b + 3 = 5.

b) Guide pupils on the use of operations to solve simple algebraic equations
3y - 2 = 10
3y - 2 + 2 = 10 + 2 (Add 2 both sides)
3y + 0= 12
= 12/3 (Divide by 3 both sides)
y = 4

c) Guide them to write the correct answer.

Learning Assessment

Observe the pupils if they are able to solve simple algebraic equations. Use other techniques to help those pupis who failed.

7.2 Main Competence: Think and Conceptualize Ideas in Everyday Life

This main competence will help a pupil to think logically and verify the accuracy of what he thinks in performing various activities, in developing main competence of thinking and conceptualizing ideas in everyday life:

a) Guide a pupil to use skills of pattern, measurements, shapes and figures in solving word problems in real life context.

b) Use different tools and techniques during the process of teaching and learning for a pupil to think logically.

c) Give a pupil enough time to think and verify accuracy of what he/she thinks.

This main competence is developed under three specific competences:

a) Apply the skills of measurements in solving problems in everyday life.

b) Apply concept of shapes and figures in different contexts.

c) Apply concept of patterns to solve problems in everyday life.

7.2.1: Specific competence 1: Apply the Concepts of Pattern to Solve Problems in Everyday Life.

Pattern is the arrangement of items, shapes of items, numbers, drawings, etc, in acceptable way.This pattern attracts and facilitates in solving problems which involves arrangements. Pupils of standard III and IV will be able to apply the pattern skills to solve real life problems, after doing the following activities;

a) Identify the real life pattern items

b) Identify the missing numbers in a sequence of numbers

c) Arrange numbers in descending and ascending order

d) Identify a sequence of increasing or decreasing numbers.

The teacher who develops this specific competence should have;

a) Sufficient knowledge of pattern skills in problem solving.
b) Skills in using different methods and techniques in developing the skills to pupil's.
c) Innovations in teaching by using the present contexts.

The importance of applying pattern skills in problem solving is:

a) Applying the pattern skills knowledge to learn other skills such as operation of numbers.
b) Applying the pattern skills in real life activities, e.g putting items in pattern, presenting information in good pattern, etc.
c) Identifying real life challenges and overcoming them in pattern.

Main Activity: Identification of Numbers and Items Pattern

Specific Activity 1: Identifying Items that are in pattern in real Life

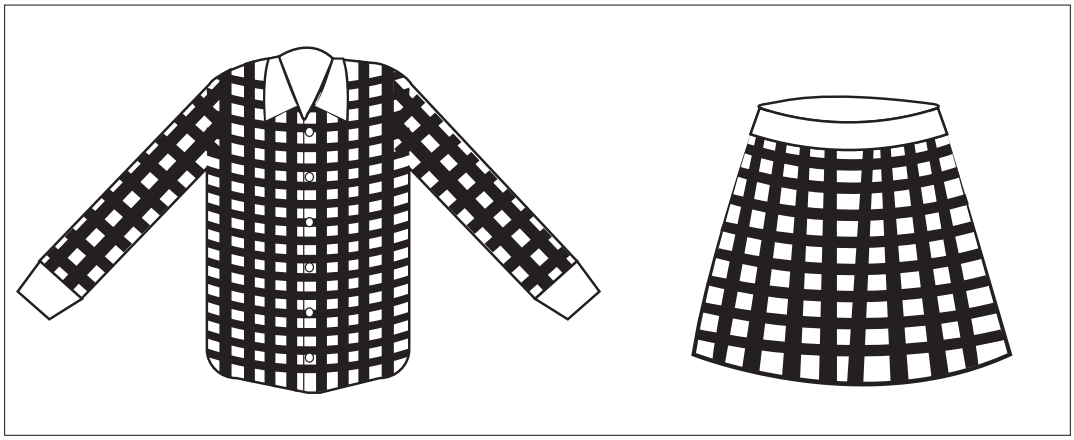
a) Things to consider when teaching and learning on how to identify items that are in pattern in real life.
    i) Prepare various objects, drawings, photographs or reports that depicting patterns.
    ii) Illustrate their patterns.
    iii) Relate the patterns illustrated with items in their contexts.
b) **Teaching and learning how to identify things that are in pattern in real life**. Use methods/different participatory techniques to guide pupils to identify things that show patterns in real life. Give enough time to pupil to explore the various objects patterns in their contexts.

Teaching Materials: Real objects that are present in their contexts, e.g benches, stairs, flower, beds, and buildings; drawings of various objects images, shapes made with paper, report written in pattern, etc.

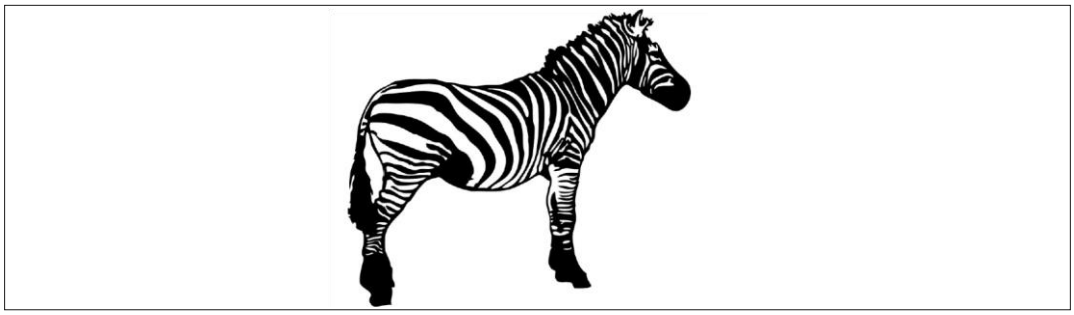
How to teach

i) Guide pupils to prepare some tools which shows patterns, example illustrated fabrics/textiles containing verses with chronological patterns, stairs, etc.
ii) Prepare other devices which show pattern, for instance; drawings of objects, shapes made with pattern, photos, etc.
iii) Distribute to the pupils, and then lead them to identify by mentioning / showing the pattern of those tools.
iv) Visit the school environment and inside the classroom and through questions lead pupils to name and list things that show pattern in the school area.
v) Ask pupils to write on their exercise books by listing things that are in pattern which alocated outside the school context.

Example: Some of the items that show the pattern are as follows: Various striped clothes/ systematized colour.



Guide them to discuss things that can be organized in pattern. For example: Cups, plates and bowls.
Animals with brilliant beauty patterns.



Guide pupils to identify the pattern of the mentioned things above and other things that have been prepared, by naming, showing and writing in their exercise books.

Learning Assessment

Assessment would base more on learner practices on identifying pattern substances in real life. Assess step by step if the pupil has been able to mention, show, list or draw patterned objects correctly and find the alternative techniques to help pupils who failed.

Specific Activity 2: Identifying the missing numbers in a sequence of numbers.

a) Things to consider when teaching and learning on how to identify the missing numbers in a sequence of numbers
   i) Prepare cards of numbers basing on a sequence of numbers.
   ii) Prepare real objects such as chairs, tables, books, and drawings / photographs of real objects. iii) Begin with the practical teaching, so as to discover the missing numbers and how they can be obtained.

b) Teaching and learning on how to identify the missing numbers in a sequence of numbers

Use practical techniques in involving pupils to identify the missing numbers in a sequence of numbers, then give them questions based on sequence of numbers with missing numbers. Give the pupils more time to think and fill correctly the missing numbers. Guide them to relate with the their environment so as to determine the pattern of things and fill the missing one.

Teaching Materials: Real objects in their environment. For example; Card numbers, chairs, tables, benches, flower beds and planted flowers, drawings of various objects, photos, etc. **How to teach**

i) Guide pupils to prepare similar objects in a sequence.
ii) Prepare cards with numbers in a sequence.
iii) Distribute those cards to the pupils, then lead them to attach the written card numbers on the objects which are in pattern.
iv) Guide the pupils to read that sequence of numbers.
v) Remove some of the numbers / remove middle objects in that sequence then lead the pupils to identify the objects /numbers removed.
vi) Give the pupils a sequence of numbers with varying composition.
vii) Guide them to discover the mechanism deployed in creating that sequence of numbers in order to be able to identify missing numbers by using the same procedure. viii) Give pupils various exercises to identify the missing numbers in a sequence of numbers.

Example: The following is the sequence of numbers fill a missing numbers, the process used to built that sequences were indicated on the blackets;

a) 2, 5, 8, 11, 14, 17, ..., ... (add 3)
b) 100, 96, 92, 88, 84, ..., ... (substract 4)
c) 2, 4, 8, 16, 32, 64, ..., ... (multiply by 2)
d) d) 14, 26, ..., 50, ..., 74, 86 (add 12)
e) 93, 82, 71,..., ..., 38, 27(substract 11)
f) 1, ..., ..., 125, 625, 3, 125 (multiply by 5)

Learning Assessment

Assessment should based more on pupil's practical work in filling the missing numbers in a sequence of numbers correctly. Find the methods/techniques to help pupils who failed.

7.2.2 Specific competence 2: Apply the Skills of Measurement in Different Context

Measurement is one of the important aspects in our daily life. We use measurements to make approximations of dimensions like length of an outfit, the weight of an item, to determine how much medication a

patient should take, the height of a roof and sometimes the amountof fuel a vehicle tank is to be filled for planned trip. The concept of measurements is based on comparison between two or more objects. For example, it's important to compare lengthy objects for the length measurement to be determined.

For a pupil to achieve the competence of applying the skills of measurement in different contexts he/she should attempt various activities such as: a) Identify height measurements

b) Compare height of objects
c) Measure, read and record height
d) Identify measurements of weight
e) Compare weight of objects
f) Measure weight of objects

The importance of using skills of measurements in varied contexts Measurements are significant as they enable us:

i) To know the amount of raw materials to be used for a particular task. For example, what amountof flour is needed to make ugali for five people.
ii) To save the cost of living which arise from misuse of resources due to mere guess work.
iii) To strengthen immunity and reduce accidents that could be caused by inaccurate amount used. For example, the amount of medication to be prescribed to a child or the road width necessary for particular vehicles

Teacher's Competence

i Be able to involve pupils in identifying height measurements
ii) Have enough knowledge on content of measurements
iii) Have understanding of the use of measurements in daily life.

Main Activity: Using Measurements

Specific Activity 1: Identify measurements of height

Teaching and Learning Technique: You can use demonstration, group discussion and Think-pair-share.

Teaching Materials: Rope, Ruler, Tape measure, Exercise book, Pencil, Pen, Book, and Table.

Specific Activity 2: Identify short and tall objects

How to teach

i) Take the pupis outside the classroom.
ii) Show them trees surrounding the class there are not trees let them look at three houses two.
iii) Ask them to compare the height of those trees or houses
iv) Go back to classroom and arrange the pupils into groups.
v) Give them sticks for identifying their heights.
vi) Arrange three items with distance apart and ask the pupils to identify which of them is far and which is near
vii) Put items with unequal height together, let the pupils identify and arrange those with equal height together.

Feedback

i) In order to identify that one item is longer than the other, its necessary to measure it.
ii) Measuring instruments are needed to measure objects.
iii) Bring the pupils outside the classroom where there is sand, put a mark from which he/she can start jumping and ask another pupil to put a mark where the first one ended.
iv) Ask pupils to mention tools which can be used to measure this height.

Specific Activity 2: Identify the specific measurement of heights

How to teach

i) Distribute the specific measurement instruments (tape measure and ruler) and instruct them to read there measuments.
ii) Help pupils to identify the measurements.
iii) Show the pupils how to measure various items like exercise books, pencil, book etc. and how to read its length.
iv) Instruct them in groups on how to measure the available items in the classroom. v) Instruct them in groups to measure their own height.
v) Ask them to read the length of the measured objects.
vi) Ask them to record the length of the measured objects.

Feedback

In this section the pupils can mention the specified and unspecified measurements, since unspecified measuments were used in standard II, so in standard III up to VI specified measurements will be used which are meter, centimeter and tape measure.

Assessment

Refer to the syllabus check the suggested performance levels and follow them to determine how many have understood the lesson and how many needs more help.

Main Activity 2: Using Measurements of Weight

Teaching and Learning Technique: You can use the demonstration, group discussions, think - pair -share.

Teaching Materials: Bags, sand, stone, boxes with and without chalks, erasers, balances and trapeza.

Specific Activity 1: Identify things with heavy and small weights

How to teach

i) Put heavy sand on a bag then ask the pupil to lift it with on hand.
ii) Put bran or something else which is light then give to the same pupil to lift and to compare it.
iii) Ask what has been identified from the two bags?
iv) Do this exercise for different ten pupils
v) Give different stones to lift and identify the heavy stone and lighter stone
vi) Take pupils out of the class; instruct how to play the trapeze.
vii) Let them play that game as they realized who is heavy and light, who have equal weight.

Feedback

Finding out the heavier or lighter objects you should verify that by measuring their weight. Example: A bucket of sand and a bucket of bran or cotton which one is heavier? Which answer do you expect from the pupils or In what way you think they can answer, “teacher I can not lift a bucket of sand but i can lift a bucket of bran,” if the answer is as that then use the question technique. Ask them why they failed to lift the sand bucket, when could lift a bran bucket? The answer will probably be, the sand bucket is heavier than a bran bucket”; if they can not give the answer explain it to them.

Specific Activity 2: Identifying specific measurements of weights

i) Show them how to measure and read weight of various objects.
ii) In groups, give a beam balance and items to measure.
iii) Ask them to read and record the weight of the objects
iv) Ask them to compare the weight of one object and the other thing, then discuss the difference between the weight of one and another things
v) Change the measurements of weight.
vi) Guide pupils to perform the addition, subtraction, multiplication and division operations of the weight measurements.

Feedback

In order to measure the weight of the items we use measuring instruments, such as beam balance.

Assessment

Refer to the syllabus check at the performance levels suggested to determine how many have understood the lesson and how many need more help.

7.2.3. Specific competence 3: Apply Skills of Shapes to Solve Problems in Mathematics Context

Shape skills is the study of Mathematics which deals with objects which have two or non-two dimensional figures. Pupils of standards III to VI would be able to apply shape skills in solving mathematical problems after doing the following activities;

a) Identifying two and non-two dimensional figures.
b) Naming the two dimensional figures
c) Making the two dimensional figures
d) Drawing the two dimensional figures
e) Making ornaments by using the two dimensional figures
f) Mentioning objects that have two dimensional figures in the environment
g) Identifying and mentioning the objects that have three dimentional figures in the local environment.
h) Drawing a straight line and a piece of line
i) Measure the circumference of two dimensional figures.
j) Calculating the circumference and area of a square, rectangle and triangle
k) Solving the circumference problems

Teacher's Competence

a) Sufficient knowledge about shapes skills in problem solving.
b) Skills in using different methods and techniques in building this competence in pupils.
c) Creative in teaching using the local environment.

The importance of skills of shapes in solving problems

i) Applying the knowledge of shape skills to learn other skills such as painting, tailoring, surveying, production and product loading.
ii) Applying shapes skills in normal life activities. For examples in mapping, building, and creating objects.
iii) Identifying and overcoming real life challenges and overcome.

Specific Activity 1: Identify two dimensional and non-two dimensional figures

a) Things to consider when teaching and learning how to identify two dimensional and non-two dimensional figures

i) Guide pupils to prepare various objects which have two dimensional and non-two dimensional figures

ii) Guide the pupils to make or draw two dimensional and non-two dimensional figures.

iii) Guide the pupils to identify two dimensional and non-two dimensional figures.

b) Teaching and learning to identify two dimensional and non-two dimensional figures

Use practical techniques/methods to guide pupils to identify two dimensional and non-two dimensional figures by identifying and listing. Give pupils enough time to think and to identify the figures correctly. Guide the pupils relate theri local environment in identifying the two dimensional and non-two dimensional figures.

Teaching Materials: Real objects from their environment, e.g writing board, books, ruler, box, bottle, bucket, manila / paper, drawings of various objects, photographs, objects made of paper / wood / clay etc,

How to teach

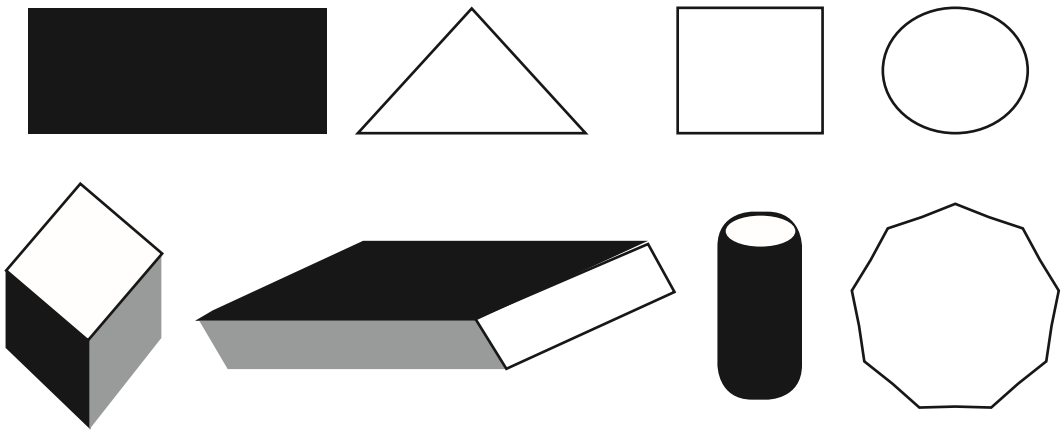
i) Guide pupils to prepare various two dimensional and non-two dimensional tools.

ii) Guide the pupils to identify the features of two dimensional and non-two dimensional figures. iii) Use these features to lead pupils to separate two dimensional and non-two dimensional figures.

iv) Guide them to mention and list other two dimensional and non-two dimensional figures.

Example:

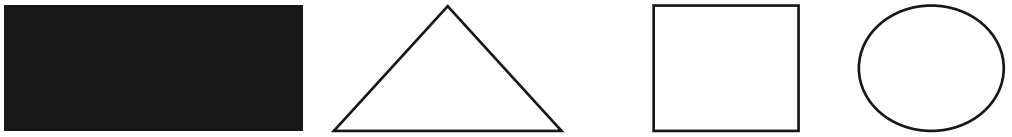
a) Two and non-two dimensional



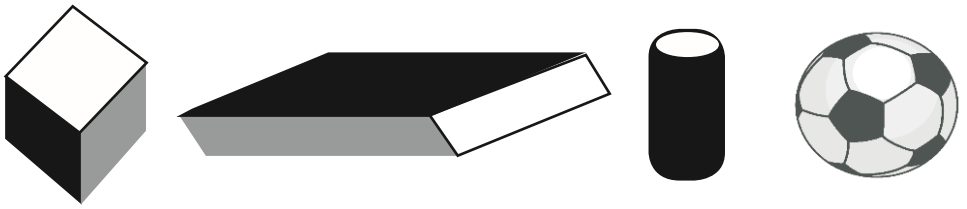
b) Guide pupils to identify that the two dimensional figures have two sides, e.g paper. But non-two dimensional figures have surface/surfaces, volumeand edges, e.g boxes and tin.

c) After identifying the two and non-two dimensional figures, guide to separate two and non-two dimensional figures

i) Two dimensional figures.



i) Non-two dimensional



d) Pupils to list other two dimensional and non-two

Learning Assessment

Assess if the pupil can identify two and non-two dimensional figures correctly. Find methods/techniques to help pupils who failed.

Specific Activity 2: Mention the names of two dimensional figures

a) Things to consider when teaching and learning the names of two dimensional figures.

i) Guiding pupils to prepare various two dimensional tools. Example; real objects, pictures, two dimensional figures made or drawn.

ii) Guide the pupils to mention the names of the two dimensional figures.

iii) Use the surrounding environment to guide pupils to learn other two dimensional figures and their names.

b) Teaching and learning of naming two dimensional figures.

Use participatory technique/methods to guide the pupils to name the two dimensional figures made or drawn. Give pupils enough time to identify the two dimensional figures and their names. Guide them to relate with their environment.

Teaching Materials: The chart that is drawn various two dimensional figures, pictures and real objects.

How to teach

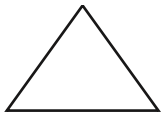
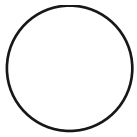
i) Guide pupils to prepare various two dimensional tools.

ii) Prepare the drawings or photos of two dimensional figures.

iii) Guide pupils to mention the names of those things, then guide them to identify the correct names of the two dimensional figures.

iv) Guide them to name and list other two dimensional figures

Example: Two dimensional figures

Two Dimensional figures	Name
	Triangle
	Rectangle
	Square
	Circle

Learning Assessment

Assess if the pupil can mention the names of two dimensional figures correctly. Find methods /techniques to help pupils who failed

Specific Activity 3: Drawing a straight line and piece of line.

a) Things to consider when teaching and learning to draw a straight line and a piece of line.

i) Prepare tools such as, rulers, pencils, manila/paper, line drawings and a piece of line, etc.

ii) Guide the pupils to identify a straight line and a piece of line and to draw correctly.

b) Teaching and learning to draw a straight line and a piece of line.

Use participatory methods /techniques to guide the pupils to draw a straight line and a piece of line. Give pupils enough time to identify and draw a straight line and a piece of line correctly, then to write these names by showing a straight line and a piece of line.

Teaching Materials: Line and a piece of line drawings, pencil, manila/paper and rulers.

How to teach

Guide pupils to prepare tools such as, rulers, pencils, manila/paper, line and a piece of line drawings.

i) Guide the pupils to identify the line and the characteristics of piece of line.

ii) Show them the lines and pieces of lines drawn on manila / single sheet.

iii) Guide them to mention and show a piece of line and the line correctly.

iv) Guide them to draw a line and a piece of line by using a ruler.

v) After drawing, guide them to identify a line and a piece of line by writing those words.

Example

Piece of line

Straight line

Learning Assessment

Assess if the pupils are able to identify a line and a piece of line and to draw correctly. Find methods / techniques to help pupils who failed

Specific Activity 4: Measument of the circumference of two dimensional figures

a) Things to consider when teaching and learning the circumference of two dimensional figures measurements.

i) Guiding pupils to prepare various two dimensional tool / tools. For example real two dimensional objects and drawings, thread and ruler.

ii) Practically guide pupils to measure the circumference of two dimensional figures.

b) Teaching and learning to measure the circumference of two dimensional figures.

Use practical techniques/methods to guide the pupils to measure the circumference of two dimensional figures. Guide them to read and record the measurements accurately. Give pupils enough time to measure the circumference of the existing two dimensional figures in their contexts and other drawn two dimensional figures. **Teaching Materials**: Two dimensional real objects of their environment, for example writing board, manila/paper; flat drawings of various objects, rulers and yarn.

How to teach

i) Guide pupils to prepare tools such as, rulers, pencils, manila/ paper, drawings of two dimensional figures, etc.

ii) Guide the pupils to measure the circumference of two dimensional figures by using thread.

iii) After measuring the perimeter of two dimensional figures by using a thread, measure a thread perimeter by using a centimeter marked ruler and record the values.

iv) Guide to read the recorded values correctly.

Learning Assessment

Assess if the pupil is able to measure the circumference of two dimensional figures by using a thread and a ruler. Check how he/she is recording the values and if he/she is reading correctly. Find the methods /technique to help pupils who failed. **Specific Activity 5**: **Calculating the perimeter of the square, rectangle and triangle.**

a) Things to consider when teaching and learning to calculate the circumference of a square, rectangle and triangle.

i) Prepare tools/ various animated materials such as square, rectangle and triangle, ruler.

ii) Guide the pupils to understand the principles used in calculating the circumference of each figure.

iii) Practically guide pupils to calculate the circumference of square, rectangular and triangular figures.

b) Teaching and learning to calculate the circumference of two dimensional figures

Guide the pupils to get the method used in calculating the circumference of the respective figure. Use practical techniques/methods to guide the pupils to calculate the circumference of each individual

figure. Give pupils enough time to calculate the circumference of each figure correctly.

Teaching Materials: Squares, rectangle and triangle drawings and ruler.

How to teach

i) Prepare the respective measured drawing figure, e.g square

ii) Guide pupils to identify the measurement of all sides for that figure.

iii) Guide pupils to identify the method that is reguired to calculate the perimeter of that figure.

iv) Guide them step by step to use the method to calculate the perimeter of that figure.

v) Guide to write the correct` the answer.

Example: Calculate the perimeter of the figure below: 4 cm

i) Guide pupils to identify that the square has equal sides so each side has 4 cm.

ii) Remind them that during taking the measument of square by using a thread, they added all sides of the figure to get the circumference.

iii) Guide the pupils to identify that the circumference of the square will be obtained by adding all sides' centimeters.

iv) Therefore the principle of calculating the circumference of the square is side + side + side+ side (4 x side).

v) Thus the circumference of the square is 4cm + 4cm + 4cm + 4cm =16cm (4cm x 4sides = 16 cm).

vi) Ensure that pupils have written the answer with specific unit, that is if it is 16 centimeters they write 16 cm, not16 as a numbers alone.

vii) Follow the steps above to calculate the circumference of a rectangular and triangle figures.

Learning Assessment

Assess whether pupils are able to calculate the circumference of the square, rectangular and triangular by following the steps. Check if the answer obtained is correctly written. Find methods /techniques to help pupils who failed.

7.2.4 Specific competence 4: Apply Skills of Shapes to Calculate Areas of Two Dimensional Objects

Things to consider when teaching and learning how to calculate areas of a rectangle, square and triangle.

a) Prepare various tools for example rectangular drawings and ruler.

b) Prepare the methods to be used to calculate the area of a rectangle, square and triangle.

How to teach

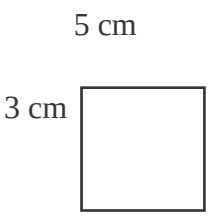
i) Guide pupils to identify long and short side of the figure.

ii) Guide pupils to know that, the rectangle has length and width.

iii) Guide them to use the method to calculate the area of the rectangle.

iv) Identify the area by counting squares made on the rectangle.

Example, Find the area of rectangle by using square centimeters boxes



5 cm

3cm

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15

i) Guide pupils to calculate the area by counting the square boxes inside the figure.

ii) Guide them to know that the area of the rectangle can be calculated by multiplying one length and one width.

iii) Therefore the method of calculating the area of a rectangle is length x width (3cmx5cm).

iv) Remind the pupils that, multiplication of the like terms are written in expenential forms (a x a) = a^2

v) Make sure that the answer is written with the specified units (5cm x 3cm) = 15cm^2.

vi) Check those steps to calculate the area of square, parallelogram, trapeza and triangle.

Assement of learning

Assess whether pupils can calculate the area of a rectangle, square, triangle, parallelogram and trapeza by following the steps. Check if the answers obtained were written correctly. Find the techniques to help the pupils who failed.

7.3 Main Competence: Solve Problems in Different Contexts

This is the process of analysing the detailed information about problems in order to reach a solution of the given problems. Solving problems can be carried out systematically by involving a person's ability to think critically and using different methods. To solve problems you should follow the relevant steps necessary to solve those problems. One of the important aspects in solving problems is the ability to think, analyze, design and follow-up actions to achieve resolution. Mathematics for this case becomes an important tool.

The importance of main competence

This main competence will help a pupil understand how to use mathematical skills to solve individual problems and those community around him/her in different contexts.

This competence is developed specifically under the following two:

a) Apply mathematical operations to solve problems.

b) Apply number relations to solve problems in different context.

7.3.1 Specific competence 1: Apply Mathematical Operations to Solve Problems

It is the act of finding solution of a problem by adding or subtracting number of items from the items that one has.

Activities in this competence a)

Addition of numbers

b) Subtraction of numbers

c) Multiplication of numbers

d) Division of numbers

e) Solving word problems

Teacher's Competence

Be able to develop teaching and learning and techniques for use in developing pupil's ability to add and subtract items aids.

Have sufficient skills in using mathematical operations to solve various problems

The importance of using mathematical operations in solving problems a)

It helps to simplify problems.

b) It facilitates operations.

Things to Consider

i) To form a bundle of sticks in stacks containing ten, one hundred and one thousand sticks. ii) Transfer bunch of sticks from one group to another group of tens, hundreds or thousands.

iii) Follow the required steps in performing long division.

Main Activity 1: Addition of Numbers

Specific Activity 1: Addition without carrying forward

Teaching and Learning Technique: Demonstration, questions and answers

Teaching Materials: Counters, stacks of sticks, a number tray, an abacus.

How to teach

i) Remind them by giving examples of adding the number of a few items.

ii) Write an example of addition on the board or flip chart.

iii) Ask the pupils to arrange sticks wrapped in stacks / heaps

iv) Lead pupils to arrange sticks that have been tied in portions on a number tray

v) Lead pupils to arrange sticks that have not been tied out in two groups based on the value of the digits in the numbers on a number tray written on the blackboard / flipchart.

vi) Ask the pupils to put those stacks and sticks together.

vii) Ask them to count the total number of stacks of sticks and twigs.

viii) Ask them to give a total of stacks and sticks?

ix) Use larger numbers between 1000 and 9999 showing no change generalizes. **Note**: Take into consideration the numerical limits of the pupil's class level.

Feedback

Addition without carrying forward can be done in two ways; through horizontal and vertical way. Both means provide an opportunity to add for conforming units with units, tens and tens as well as thousands of thousands. Make sure you use both methods to enhance the understanding of the pupils. Provide adequate exercises and review pupil's work. Also, teacher should explain to the pupils on the use of this competence in their daily life and to help other pupils who have not reached the required level of performance.

Assessment

Find out if;

i) Pupils are able to arrange things according to the value of the digits of a number.

ii) After mixing sticks and stacks have obtained the correct number of stacks and sticks.

Specific Activity 2: Addition by carrying forward

How to teach

j)Give two numbers that should be added and write them on the board

ii) Have pupils organize stacks and sticks depending on the value of the digits in all the numbers and put them into two groups.

iii) Tell them to put together the sticks and stacks from the two groups according to their value.

iv) Observer whether the pupils remember the order of closing ten items, remind and insist ehem to follow the same routine every counting ten items and transfer them where applicable.

v) Ask them the total number of sticks and stacks for each group of units, tens, hundreds and thousands.

Feedback

Addition by carrying forward occurs when accessed items exceed the number of positions of the numbers. For example if you are adding nine sticks with two sticks you get eleven sticks, it is okay to have one-tenth and one stick so over ten sticks and transfer them part of tens. If there were other tens then the number has increased.

Example

Add without carrying Add by carrying

Vertical Method

(a) 4372

+ 5206

9578

(b) 6849

+ 1615

14 ones

50 tens

1,400 hundreds

7000 thousands

Horizontal Method

4372+5206=9578 **Answer:** 8464

Assessment

Find out if a pupil is able to:

i) Organize items into categories based on the value of the digits of the number.

ii) Find the correct number of stacks and sticks.

Specific Activity 3: Word problems on Addition

i) Start with example having a small number of items.

ii) Ask pupils to read or listen carefully to the information or statements given.

iii) Ask pupils to summarize the information by pointing important details. iv) Tell them to put that information in writing.

v) Ask them to write that information into a mathematical sentence. vi) Ask them to add items the way they did in the past.

Example: Matomete village has 4361 women and 5260 men. How many residents does the village have?

Guide pupils to know that the sum is addition.

4361 Women+ 5260 Men = Total population

4361 + 5260 = residents? 4361 + 5260 = 9621

```
   4361
+  5260
   9621
```

:. Matomete village has a total of 9621 residents

Feedback

In solving problem relating to numbers, the teacher should make sure all steps are followed, including understanding and interpreting the question and setting it into number operations. Often, word problems enable a pupil to show his/her understanding and the use of the skills he has.

Assessments

Find out if the pupils are able to:

a) Identify the key elements in the statement.
b) Write notes / reports precicely in mathematical sentences.
c) Add items correctly.

Main Activity 2: Subtraction of Numbers Specific Activity 1: Subtraction without borrowing **Teaching and Learning Technique:** Demonstration

Teaching aids: Sticks, stacks of sticks, Flip Chart

How to teach

i) Start with an example of subtracting the number of items from a large number of items.

```
  799
- 221
```

ii) Ask pupils to read example and give the interpretation of the problem of the above example.

iii) Have pupils organize stacks of sticks depending on the value of digits in numbers. iv) Ask them to subtract by removing a number of stacks of sticks and sticks as directed.

v) Ask them to mention the number of stacks of sticks and twigs remaining based on the value of its position: ones, tens, hundreds, thousands.

Hundreds	Tens	Ones
5	7	8

Assesment

Find out if a pupil is able to:

i) Arrange the stacks of sticks and sticks correctly.

ii) Reduce the appropriate number of stacks of sticks and twigs.

iii) Subtract the correct number of stacks of sticks and Sticks.

Specific Activity 2: Subtration by borrowing

i) Start by setting an example with two digits.

ii) Ask pupils to read the example above then give its interpretation

iii) Ask pupils to arrange stacks of sticks and sticks depending on the value of digits in numbers.

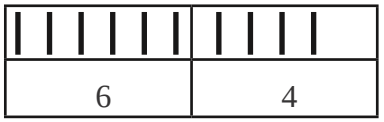
iv) Tell them to subtract by removing a number of stacks of sticks and sticks as directed.

v) Ask them to count and specify the number of stacks of sticks and sticks remained basing on the value of its position ones, tens, hundreds and thousands.

Example: 64 - 27 =

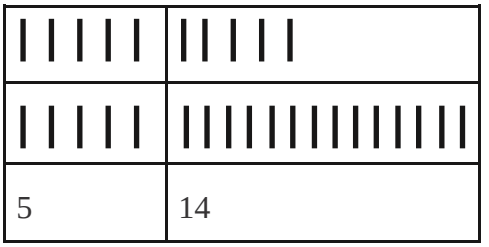
Step 1

Draw all sticks in ones and tens

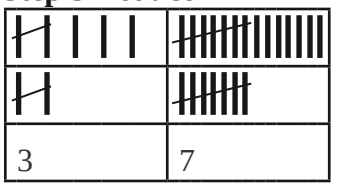


Step 2

Take one stick from tens with a value equivalent to ten sticks

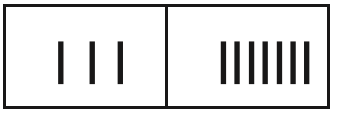


Step 3 Reduce



Step 4

Write the answer



3	7

Main Activity 3: Multiplication of Numbers

Specific Activity 1: Identify the concept of multiplication

Teaching and Learning Technique: You can use the techniques of Think-pairshare, questions and answers together with brainstorming on teaching this skill.

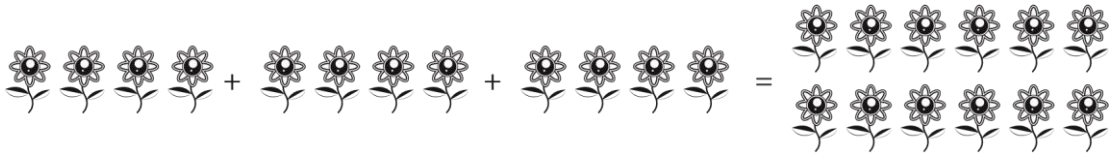
Teaching Materials: Flowers, counters, orange, diagrams, multiplication charts.

Example 1: If you have three batcheswith four flowerseach:

i) Ask three pupils to go out the classroom, each one of them pick four flowersor other similar items.

ii) Ask the remaining pupils in the class to identify the number of all picked flowers.

iii) Give them time to count the number of all flowersand give an answer.



add add Total

4 + 4 + 4 = 12

To shorten the process of adding repeatedly by the use of multiplication.

Example: 4 + 4 + 4 = 1 2

4 is written three times 4 x 3 = 12

We have three batcheswith four flowerseach. Using mathematical operations 4 flowersx 3batches = 4 x 3 = 12 Symbol **x** represents multiplication

i) Explain to the pupils how this repeated act of addition can summarized by an act of multipilication

ii) Show pupils the multiplication sign and how is being read mathematically.

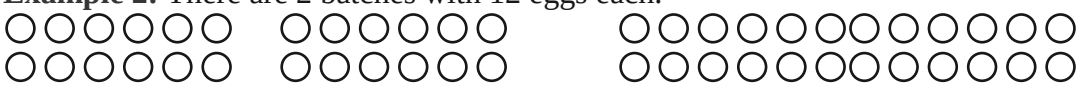
iii) Give many examples using real objects.

iv) Provide them with a lot of works to do in order to develop the concept of multiplication.

v) Give them the multiplication table and tell pupils to read regularly

vi) Compose a song to help them read the multiplication table.

Example 2: There are 2 batches with 12 eggs each.



12 + 12 = 24

12 x 2 = 24

Specific Activity 2: Word problem about multiplication

Example: A Mother has 4 chickens, how many legs do they have?

i) Ask the pupils to listen to or read information/details carefully.

ii) Tell them to summarize the report and identify objects or highlights in a statement.

iii) Tell them to put that information in writing.

iv) Ask them to write the information into a mathematical sentence.

v) Ask them to perform multiplication operations.

What is the total number of legs do four chickens have?




2	+	2	+	2	+	2	=	8	
legs		legs		legs		legs		Total legs	

The practice of adding repeatedly could be deduced by multiplication

2 x 4 = 8

The Chickens have 8 legs

Assesment

Find out if a pupil is able to:

h) Summarize and interpret information

iii) Write the statement

iv) Write the same information in a mathematical sentence.

iv) Perform multiplication operations correctly

v) Write the correct answer

Specific Activity 3: Division of numbers These operations can be done in two ways.

The first method:

Process

i) Allocate items into groups of the number of matching items.

ii) Set several numbers of items

iii) Asign one pupil to count these items.

iv) Asign another pupil to set aside those things in batches with the same number of items

v) Ask pupils how many batches of equal number of items has she/he obtained?

vi) Ask them again "how many items does each batch have?"

Example: To separate pebbles or eight counters in four equal categories

$8 \div 4 = 2$

The second method:

How to teach

i)Divide by reducing / removing items in batches.

ii) Set aside the number of pebbles or 8 counters.

iii) Call forward 4 pupils.

iv) Ask one pupil to come forward and distribute equally these pebbles or counters one by one to those pupils who are forward.

v) Ask pupils how many pebbles or counters does each pupil have?

Assesment

Find out if a pupil is able to:

i) Separate batches of equal number of items ii) Identify the number of items in each batch

7.3.2 Specific compatence 2: Apply Number Relations to Solve Problems in Different Context

Many things that we use in our daily life are strongly related to numbers. Some of those items include money and time. Money identifies the value of an item and time identifies the amount of period spent and sometimes the level of life span of the object.

In this section we will have the following activities: a) Identify different measurements of time

b) Identify the value of Tanzanian bank notes

c) Number operations relating to Tanzania's currency

Specific Activity 1: Identify different measurements of time

What does someone mean when he speaks of time? To answer this question we must look at how we spend time in our daily lives, for example the Second World War took place in 1939 to 1945. By observing the aforesaid period, there is a measure of time.

You can calculate the time spent mathematically. Generally time is the relationship between actions and period taken. Time as a measure of period is measured by; seconds, minutes, hours, day, week, month, year, decade, century and millennium. **a)**

Things to consider

- Identify pupils' understanding on the concept of measurements of time
- Make sure you have enough various tools

Teaching and Learning Technique: brainstorming, work in groups, think-pairshare and visit.

b)

Teaching Materials: Watches, calendars, cards, flipchart, and heavy ink pens.

How to teach

Pupils of standards III and IV already have prior knowledge about measurements of time, so you ought to start with this understanding. So in teaching the concepts of time you can use drawings to show time of a day, drawings of digits (digital) for reading and writing time in seconds or a complete hour with derivation of operations associated with time. Standard III should identify time in a day; mention the number of days in a week and their corresponding names, the names of months and the number of days, they should also draw faces of a clock. Standard IV should read a complete hour and minutes and perform addition and subtraction operations on hour. Standard V should multiply and divide while standard VI should perform using 12 hours or 24 hours system.

Example 1: Determine the time represented by the following image a) What time of a day does this image represent?

b) What things appear in the sky during night?

Feedback

i) This image shows the landscape of morning or evening, therefore for a pupil responding that it is morning will be correct but for the one who will respond morning or evening, will be the most appropriate answer. This is because this situation appears during sunrise or sunset.

ii) The items visible at night, because of the appearance of the sky are the moon, stars, satellites, etc.

Example 2: How do the arrows of a clock used to show time?

Feedback

Many clocks have two arrows, short and long ones. Short arrow indicates hours while long arrow represents minutes. Long arrow moves fast and when it meets a short arrow at 12 then we say its a complete hour. Note that standard III pupils should read complete hour while standard IV hours and minutes. The remaining standard should perform operations in hours. By standard VI, they will be able to complement the 12-hour and 24-hour system

Example 3: Write in digits a) quarter past two

b) five minutes past eleven

c) quarter past ten

d) quarter to eleven

Example 4: Draw circular clock faces to indicate the following hours: a) 10:00

b) 6:00

c) 1:45

d) 9:50

Example 5: Write in words the time represented by following hours: a) 10:00

b) 6:10

c) 9:30

Exercise: Addition and subtraction operations in hours

i) A teacher taught mathematics, science and ethics subjects for three, two and four hours respectively in a week. How many hours in a week did the teacher spend in teaching?

ii) A pupil left for to school at half past seven and arrived at half past eight. How much time do you think the a pupil spent along the way?

Specific Activity 2: Identify the value of the Tanzanian currency **a)**

Things to consider

Money is a measure of quality. Tanzania has two forms of currency, that is coins and bank notes. Remember in standard I and II pupils were able to identify coins, in standard III and IV should identify notes. Standard V and VI should do addition, subtraction, multiplication and division of currency.

b) Teaching and Learning Technique: You can use the technique of brainstorming, questions and answers, Think-pair-share or demonstration techniques in teaching how to identify Tanzanian bank notes.

Teaching Materials: Bank note cards with pictures, cards with images of products and their corresponding prices

How to teach

i) Ask the pupils if they know forms of currency.
ii) Based on their answers, differentiate between coins and bank notes.
iii) Let them discuss genuine and counterfeit bank notes.
iv) Ask them the use of coins and bank notes.
v) Ask them to compare the value of coins with that of bank notes.
vi) Show them bank notes which worth differently as you are asking them their values.
vii) Organise them into groups to discuss various symbols found on bank notes.

viii) Explain the importance and how to keep banknotes.

Example: Tanzania's bank notes

500sh 1000sh

2000sh 5000 sh 10000sh

Activity: Number operations for Tanzania's Money

Things to Consider

The use of currency in everyday life is accompanied by addition, subtraction, multiplication and even division operation. For example, to pay for goods of different kinds bought from a shop involves the adding operation. To receive a change after payment involves the operation act of subtraction, to pay the charge for more than one similar product involves the multiplication operation while paying people for the work they have done involves the division operation.

a) Teaching and Learning Technique: You can use the technique such as brainstorming, questions and answers, Think-pair-share or presentation techniques in teaching how to identify Tanzania's bank notes.

Teaching Materials: Bank note cards with pictures, cards with images of products and price tag.

How to teach

i) Assign the pupils into groups

ii) Each group will have a leader and a person for recording

iii) Give each group one question pertaining one of the operations

iv) Let them do the work under your supervision and finally each group present to you what they have done

v) Provide exercise for every pupil to do

vi) Give feedback after correcting the exercise

vii) Allow two to five pupils repeat the exercise in front of others.

Learning Assesment

Check if a pupil has been able to:

i) Attempt about quarter of the questions, and then he needs more help.

ii) Attempt about half of the questions, assign him to a pupil who has answered all questions correctly for assistance.

iii) Attempt correctly about three quarter of the questions to repeat the questions he has missed.

iv) Attempt correctly all the questions, tell him to demonstrate to others how he managed to get them right.

APPENDIX Table describing competences and activities GRADE III

Main Competence	Specific Competence	Main Activities	Specific Activities

1. Use the language of mathematics in presenting ideas or arguments	Apply the concept of numbers to communicate in different situations	Numbers identification	· Counting up to 9999 · Reading numbers up to 9999 · Writing numbers in digits up to 9999 · Writing numbers in words up to 9999
		Explain the place values of numbers	Identifying place values of a digit for numbers (ones, tens, hundreds and thousands)
		Fractions identification	· Dividing real objects into equal pieces or groups · Reading fraction · Writing fractions in digits
		Describe patterns things	· Identifying things which show patterns in life
		Explain the sequence of numbers	· Identifying missing numbers in a sequence of numbers
		Number patterns identification	· Arranging numbers in descending order. Arranging numbers in ascending order ·
3. Solve problems in different contexts	Apply mathematical operations to solve problems	Addition of numbers	· Adding numbers to get a sum not exceeding 9999 without carrying forward · Adding numbers to get a sum not exceeding 9999 with carrying forward · Solving word problems involving addition.

Main Competence	**Specific Competence**	**Main Activities**	**Specific Activities**

		Subtraction of numbers	· Subtracting without borrowing four digits numbers · Subtracting up to a four digit number · Solve word problems pertaining subtraction
		Multiplication of numbers	· Multiplying numbers with two digits by one digit numbers · Solve word problems pertaining subtraction
	Apply the concept of numbers to communicate in different situations	Explain measurements of time	· Identifying various units of measuring time. Identify hours in a day Mention number of days in a week and · their names · · Mention months names and their respective number of days.
		Use Tanzanian currency	· Identifying values of different Tanzanian bank notes · Mention the importance of bank notes and the use of currency
		Identify Tanzanian currency	· Adding Tanzanian currency with sum not exceeding 9999sh · Subtracting Tanzanian currency not exceeding 9999sh · Solving word problems involving Tanzanian shillings

Main Competence	**Specific Competence**	**Main Activities**	**Specific Activities**

4.Think and conceptualize ideas in everyday life	Apply the skills of measurements in different context	Use measurements of length	· Identifying measurements of length · Measure, read and record lengths of objects by using non-standard units, centimeter and metres
		Use measurements of mass	· Identify measurements of mass · Measure mass of objects by comparison and recording.
	Apply concepts of shapes and figures to solve different problems	Use 2D shapes	· Identify 2D shapes · Mention names of 2D shapes · Create 2D shapes · Draw 2D shapes · Use 2D shapes in making decorations · Mention 2D shaped objects in their surroundings
		Identify 3D figures	· Identify 3D figures · Mention 3D objects in their surrounding
5. Use the language of mathematics in presenting ideas or arguments	Apply the skills of statistics to present different information	Use statistics	· Read and interpret statistics by pictures Write the number of items for ten pictures from statistics

GRADE IV

Main Competence	Specific Competence	Main Activities	Specific Activities

1. Use the language of mathematics in presenting ideas or arguments	Apply the concept of numbers to communicate in different situations	Numbers identification	· Counting sequentially up to 9999 · Counting numbers up to 99999 · Writing numbers in digits up to 99999 · Writing numbers in words up to 99999
		Explain the place values of numbers	Identify the place values of a digit for numbers
		Roman numbers identification	· Read roman numbers I-L · Write roman numbers I-L · Mention the use of roman numbers
2. Think and conceptualize ideas in everyday life	Apply concepts of patterns to solve problems in everyday life	Explain the sequence of numbers	· Identify increment or decrement of numbers in a sequence Identify missing numbers in a · sequence
3.Solve problems in different contexts	Apply mathematical operations to solve problems	Addition of numbers	· Add numbers summing to not more than 9999 without carrying a number · Add numbers summing to not more than 9999 by carrying a number · Solving word problems on addition
		Subtraction of numbers	· Subtracting up to a five digit number without borrowing · Subtracting a five digit number by borrowing · Solving word problems on subtraction

Main Competence	Specific Competence	Main Activities	Specific Activities
		Multiplication of numbers	· Multiply a three digit numbers by a multiple with up to two digits · Solve word problems on multiplication
		Division of numbers	· Divide objects into equal groups · Divide numbers with up to three digits by a dividend with up to two digits without a remainder · Solve word problems on division
		Use fraction	· Add fractions with common denominator · Subtract fractions with common denominator
	Apply the concept of numbers to communicate in different situations	Use time	· Reading time in hours and minutes · Writing time in hours and minutes · Adding time in hours and minutes · Subtracting hours and minutes · Solving word problems involving time
		Use Tanzanian currency	· Add Tanzanian shillings

			· Subtract Tanzanian shillings · Multiply Tanzanian shillings · Solving word problems involving Tanzania shilling
4.Think and conceptualize ideas in everyday life	Apply the skills of measurements in different contexts	Use measurements of length	· Convert metric units of length · Measure length using metric units

Main Competence	**Specific Competence**	**Main Activities**	**Specific Activities**
		Use measurements of mass	· Convert measurements of mass Solve word problems involving · measurements of mass
		Use measurements of volume	· Identify various measurements of volume used in the local context · Measure volume using various measurement tools · Solving word problems involving measurement of volume
	Apply concepts of shapes and figures to solve different problems	Use shapes	· Draw straight line and line segment · Measure perimeters of two dimensional figures · Calculate perimeters of a square, rectangle and triangle · Solve word problems involving perimeter

5.Use the language of mathematics in presenting ideas or arguments	Apply the skills of statistics to present different information	Use statistics	· Collect and record data Draw pictorial statistics using · presented data.

GRADE V

Main Competence	Specific Competence	Main Activities	Specific Activities
1. Use the language of mathematics in presenting ideas or arguments	Apply the concept of numbers to communicate in different situations	Number identification	· Count up to 999999 · Read up to 999999 · Write numbers in numerals up to 999999 · Write numbers in words up to 999999
		Explain the place values of numbers	Identify place values for numbers (ones, Tens, hundreds, thousands, ten thousands and hundred thousands)
		Use fraction	· Compare fractions · Identify types of fractions
		Decimal identification	· Read numbers up to two decimal places · Write numbers up to two decimal places
2. Think and conceptualize ideas in everyday life	Apply concepts of patterns to solve problems in everyday life	Identify types of numbers	· · List types of numbers Mention even numbers · Write even numbers · Mention odd numbers · Write odd numbers · Mention prime numbers · Write prime numbers
		Identify factors of the numbers	· List factors of a number.

			· Calculate Highest common Factor (HCF) of two numbers
		Identify multiples of the numbers	· List multiples of a number · Calculate the Lowest Common Multiple (LCM) of two numbers

Main Competence	Specific Competence	Main Activities	Specific Activities
		Square identification	· Calculate a square of a number not exceeding 10000 · Write the square root of a number not exceeding two digits. · Solve word problems involving square roots · Write the square root of a number not exceeding three digits. · Solve word problems involving square root of a number
3.Solve problems in different contexts	Apply mathematical operations to solve problems	Addition of numbers	· Add numbers to get a sum not exceeding 999999 without carrying forward · Add numbers to get a sum not exceeding 999999 by carrying forward · Solve word problems involving addition
		Subtraction of numbers	· Subtract numbers up to six digits without borrowing · Subtract with borrowing of six digit numbers · Solve word problems involving subtraction.
		Multiplication of numbers	· Multiply numbers to get a product not exceeding six digits · Solving word problems involving multiplication.

Main Competence	Specific Competence	Main Activities	Specific Activities
		Division of numbers	· Divide numbers up to six digits a three digit number with remainder · Divide a three digit number by divisor not exceeding two digits with remainder. · Solve word problems involving division
		Use fraction	· Add fractions with different denominators. · Subtract fractions with differen denominators · Multiply fractions
		Use decimals	· Add numbers up to two decima places · Subtract numbers up to two decimal places · Multiply numbers with two decimal places by a whole number
	Apply the concept of numbers to communicate in different situations	Use measurements of time	· Make a calendar · Convert units of time · Multiply units of time · Divide units of time

Main Competence	Specific Competence	Main Activities	Specific Activities
		Use Tanzanian currency	· Write Tanzanian currency in shillings and cents · Add Tanzanian shillings to get a sum not exceeding 999999 · Subtract Tanzanian shillings up to 999999 · Multiply Tanzanian shillings to get a product not exceeding999999 · Divide Tanzanian shillings not exceeding 999999 · Solve word problems involving purchase and sales
4.Think and conceptualize ideas in everyday life	Apply the skills of measurements in different context	Use measurements of length	· Add metric units of length Subtract metric units of length ·
		Use measurements of mass	· Identify metric units of mass (milligram up to tone) · Add metric units of mass · Subtract metric units of mass · Convert metric units of mass
		Use measurements of volume	· Add metric units of volume Subtract metric units of volume · · Convert metric units of volume

Main Competence	Specific Competence	Main Activities	Specific Activities
	Apply concepts of shapes and figures to solve different problems	Identify types of angles	· Identify types of angles · Draw angles by sketching · Identify lines of symmetry in various shapes and figures
			· Identify types of triangles · Mention properties of triangles · Calculate area of a triangle · Calculate area of a rectangle · Calculate area of a square
5.Use the language of mathematics in presenting ideas or arguments	Apply the skills of algebra to solve problems in everyday life	Use algebra	· Formulate algebraic equation · Add algebraic terms · Subtract algebraic terms Multiply · algebraic terms to get a product not more than exponent 2. · Divide algebraic terms
	Apply the skills of statistics to present different information	Use statistics	· Calculate average by using different data · Read and interpret bar graphs

Main Competence	Specific Competence	Main Activities	Specific Activities
Use the language of mathematics in presenting ideas or arguments	Apply the concept of numbers to communicate in different situations	Number identification	· Count up to 10000000 · Read up to 10000000 · Write a number in numerals up to10000000 · Write a number in words up to 10000000
		Explain the place values of numbers	Identify place value of numerical digits (ones, tens, hundreds, thousands, ten thousands, hundred thousand and millions)
		Whole numbers identification	Write whole numbers on a number line
		Use decimals	· Read decimals to three decimal points · Write decimals up to three decimal places · Approximate a whole number to the nearest tens, hundreds and thousands · Approximate a decimal number to a given number of decimal places
2.Think and conceptualize ideas in everyday life	Apply concepts of patterns to solve problems in everyday life	Factors and multiples identification	Calculate the GCM of three numbers Calculate LCM of three numbers

		Use percentages, decimals and fraction	· Change percentages into decimals · Change percentages into fraction · Change fraction into decimal · Change decimal into fraction · Change decimal into percentage · Change fraction into percentage

GRADE VI

Main Competence	Specific Competence	Main Activities	Specific Activities
3.Solve problems in different contexts	Apply mathematical operations to solve problems	Addition of numbers	· Add numbers to get the sum not exceeding 10000000 without carrying forward · Add numbers to get the sum not exceeding 10000000 by carrying forward · Solve word problems involving adding numbers
		Subtraction of numbers	· Subtract up to ten million without borrowing · Subtract up to ten million with borrowing · Solve word problems involving subtraction
		Multiplication of numbers	· Multiply numbers to get a product not exceeding ten million · Solve word problems involving multiplication
		Division of numbers	· Divide a number not exceeding ten million with remainder · Divide a number not exceeding ten million with remainder · Solve word problems involving divisions

		Use decimals	· Subtract decimals up to three decimal places · Multiply a three decimal places number by a one decimal place number · Multiply a three decimal places number by a whole number · Divide numbers which result to a number with not more than two decimal places
		Use whole numbers	· Addition of whole numbers · Subtraction of whole numbers · Multiplication of whole numbers · Division of whole numbers
	Apply the concept of numbers to communicate in different situations	Use measurements of time	· Read time in 12hours format · Write time in 12hours format · Read time in 24hours format · Write time in 24hours format · Change time from 12 hours format to 24 hours format · Change time from 24 hours format to 12 hours format · Solve word problems involving time
4.Think and conceptualize ideas in everyday life	Apply the skills of measurements in different context	Use measurements of length	· Multiply metric units of length · Divide metric units of length

		Use measurements of mass	· Multiply metric units of mass · Divide metric units of mass
		Use measurements of volume	· Multiply metric units of volume · Divide metric units of volume

Main Competence	Specific Competence	Main Activities	Specific Activities
	Apply concepts of shapes and figures to solve different problems	Identify types of angles	· Measure angles using standard measurement tools · Draw angles using standard measurement tools · Identify parallel and perpendicular lines. · Calculate degrees in angles
		Use shapes and figures	· Identify rectangular shapes · Mention properties of rectangular shapes · Calculate perimeter of parallelograms and trapeziums · Calculate area of parallelograms · Calculate area of trapeziums · List three dimensional shapes · Draw three dimensional objects · Make three dimensional objects · Calculate circumference of a circle · Calculate area of a circle · Calculate surface area of a rectangular prism · Calculate surface area of a cube · Calculate surface area of a cylinder · Calculate volume of a rectangular prism · Calculate volume of a cube · Calculate volume of a cylinder

GRADE VII

Main Competence	Specific Competence	Main Activities	Specific Activities

Main Competence	Specific Competence	Main Activities	Specific Activities
3.Solve problems in different contexts	Apply mathematical operations to solve problems	Addition of numbers	· Add numbers to get the sum up to 10000000 without carrying forward · Add numbers to get the sum up to 10000000 by carrying forward · Solve word problems involving adding numbers
		Subtraction of numbers	· Subtract up to ten million without borrowing · Subtract up to ten million with borrowing · Solve word problems involving subtraction
		Multiplication of numbers	· Multiply numbers to get a product up to ten million · Solve word problems involving multiplication
		Division of numbers	· Divide a number up to ten million with remainder · Divide a number up to ten million with remainder · Solve word problems involving divisions

		Use decimals	· Subtract decimals up to three decimal places · Multiply a three decimal places number by a one decimal place number · Multiply a three decimal places number by a whole number · Divide numbers which result to a number with more than two decimal places
		Use whole numbers	· Addition of whole numbers · Subtraction of whole numbers · Multiplication of whole numbers · Division of whole numbers
	Apply the concept of numbers to communicate in different situations	Use measurements of time	· Read time in 12hours format · Write time in 12hours format · Read time in 24hours format · Write time in 24hours format · Change time from 12 hours format to 24 hours format · Change time from 24 hours format to 12 hours format · Solve word problems involving time
4.Think and conceptualize ideas in everyday life	Apply the skills of measurements in different context	Use measurements of length	· Multiply metric units of length · Divide metric units of length

5. Solve mathematical problems in different situations	Apply mathematical operations to solve real-life problems	• use whole numbers • Fractions • Use Sources of profit and loss in buying and selling commodities • Use a Prepared income and expenditure sheets • Use a project on purchases • which is based on the buying and selling of commodities	• Division of whole numbers by fraction numbers to its simplest. • Division of Fraction with numerators up to three digits and denominators • Explains profit and loss in buying and selling commodities • Explains the meaning of income and expenditure in buying and selling various commodities • Identifies the area for the project work
	Dividing fraction by decimal and simplify to the simpler form		
	Using examples to analyse sources of profit and loss in buying and selling commodities		
	Preparing income and expenditure sheets in buying and selling commodities		
	Conducting projects based on buying and selling of commodities		
6. Applying skills of reasoning and proof in real-life situations (Part Two)	Use measurement skills in different situations	Identifying the formula for calculating the speed of moving objects and stating the meaning of its components	Calculating speed.
		Applying the formula of speed to calculate distance, time and speed	calculating distance, time, speed and its three components
		Using the concept of speed	To identify moving objects that may travel on roads, water and in air

	Identifying and distinguishing of the height, base and hypotenuse of a right-angled triangle	The height, base and hypotenuse of a right angled triangle have been correctly identified and distinguished	
	Using the Pythagoras theorem to calculate base, height and hypotenuse sides of a right- angled triangle	The Pythagoras theorem has been correctly used to calculate the base, height and hypotenuse sites of a rightangled triangle	The Pythagoras theorem
	Applying Pythagoras theorem in real life such as crossing roads, playing football, climbing up the buildings	Applying Pythagoras theorem correctly in real life situation	Pythagoras theorem
	Simplifying terms of whole numbers, fractions and decimals	Terms of whole numbers, fractions and decimals are simplified correctly	Identifies like and unlike terms in simplifying algebraic expressions
	b) Solving simple equations involving whole numbers, fractions and decimals	Simple algebraic equations involving whole numbers, fractions and decimals are solved correctly.	Identifies like and unlike terms in simple algebraic equations involving whole numbers, fractions and decimals
		c) Solving word problems of simple algebraic equations involving whole numbers,	Solve Word problems of simple algebraic equations involving whole numbers, fractions and decimals

		fractions and decimals	
7.Using statistical skills to analyse and present different kinds of statistical information		Drawing a line graph by considering important components (title of the graph, measurements, coordinates of the point and lines)	A line graph with all important components (title of the graph, measurements, coordinate geometry and lines) has been drawn correctly
	Interpreting a line graph	A line graph	Identifies information depicted by a line graph by reading the title of the graph
	Conducting statistical projects using different data based on standards information for preparing reports	Statistical projects using different data have correctly been prepared on the basis of standards for preparing reports	Specifies the area appropriate for statistical data collection