REPUBLIQUE DU CAMEROUN
Paix – Travail – Patrie

REPUBLIC OF CAMEROON
Peace – Work - Fatherland

MINISTERE DES ENSEIGNEMENTS SECONDAIRES
MINISTRY OF SECONDARY EDUCATION

INSPECTION GENERALE DES ENSEIGNEMENTS
INSPECTORATE GENERAL OF EDUCATION

MATHEMATICS TEACHING SYLLABUS

FORMS 3, 4 AND 5

Observer son environnement pour mieux orienter ses choix de formation et réussir sa vie

INSPECTION DE PEDAGOGIE CHARGEE DE L'ENSEIGNEMENT DES SCIENCES
INSPECTORATE OF PEDAGOGY IN CHARGE OF SCIENCES

December 2014

REPUBLIQUE DU CAMEROUN
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MINISTRY OF SECONDARY EDUCATION

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Order N° 419/14 /MINESEC/ IGE .... – 9 DEC 2014

To outline the syllabuses for Form III, Form IV and Form V of Secondary General Education.

THE MINISTER OF SECONDARY EDUCATION,

Mindful of the Constitution;
Mindful of the Law N° 98/004 of 14 April 1998 to lay down Guidelines for Education in Cameroon;
Mindful of Decree N°2011/408 of 9 December 2011 to reorganise the Government;
Mindful of Decree N°2011/410 of 9 December 2011 to form the Government;
Mindful of Decree N°2012/267 of 11 June 2012 to organise the Ministry of Secondary Education;

HEREBY ORDERS AS FOLLOWS:

Article 1: The syllabuses for Form III, Form IV and Form V of Secondary General Education shall be outlined as follows:

PREFACE

SYLLABUSES FOR 21ST CENTURY CAMEROON

At the beginning of this millennium, as Cameroon chooses to become an emerging nation by the year 2035, its secondary education sector faces many challenges. It should:

- Offer quality training and education to most young Cameroonians within a context marked by large classes in primary education;
- Prepare them for smooth insertion into a more demanding job market worldwide, through a pertinent teaching /learning process.

In addition, training tools have significantly evolved in their conception and implementation. A school that was mostly based on contextualised knowledge acquisition has given room, all over the world, for a school that aims at empowering learners to help them cope with complex and diversified real life situations. Instead of a school cut off from society, we now have a school deeply rooted in a society that takes into account sustainable development, local knowledge and cultures.

The implementation of this new school ,prescribed by the Law to lay down guidelines for education in Cameroon, and the necessity for socio-professional insertion require the adoption of a pedagogic paradigm for the development of syllabuses relating to **"The competence based approach with an entry through real life situations "**.

In this perspective, new syllabuses for Secondary General Education, those of Teacher Education and Training Referentials for Technical Education are part of this great change for the re-dynamisation of our education system. They are in line with the implementation of the provisions of Growth and Employment Strategy Paper (DSCE) which, by the year 2020, specifies the minimum amount of knowledge which each Cameroonian is supposed to possess by the time they leave the first cycle of secondary education.

These syllabuses define essential competencies that should be acquired by learners within the first cycle of secondary education, in terms of knowledge, know how and attitudes. They equally define the framework that will enable teachers to organise their pedagogic activities.

While congratulating all those who designed these syllabuses, I hereby exhort all the members of the education family, notably teachers, to acquaint themselves with the new paradigm, to effectively implement it and make the Cameroon education system successful.

The Minister of Secondary Education

Louis Bapes Bapes

FIRST CYCLE SYLLABUS REVIEW

A PARTICIPATORY AND INNOVATIVE APPROACH

The syllabuses that were drawn up by the Inspectorate General of Education in the Ministry of Secondary Education since 2012 are in accordance with the major guidelines for education in general and secondary education in particular as they are enshrined both in the 1998 law to lay down guidelines for education in Cameroon and in the 2009 Growth and Employment Strategy Paper(DSCE) .

These orientations could be summarised, amongst others, to train within the framework of an emerging Cameroon in the year 2035, citizens that will have a good mastery of the two official languages (English and French), deeply rooted in their cultures but open to a world in search for sustainable development and dominated by Information and Communication Technologies.

Conceived in the various Inspectorates of Pedagogy, and later introduced for trialling in secondary and high schools during the 2012/2013 school year, these syllabuses were developed with the contributions of classroom teachers and teacher trade unionists.

The new syllabuses had to undergo many changes:

- a shift from a skill based approach to a competence based approach through real life situations;
- a shift from a school cut off from society to one that prepares citizens for a smooth insertion into socio-cultural and economic activities ;
- a shift from an evaluation of knowledge to that of competences necessary to sustainable development.

When these new changes and orientations were taken into account, they naturally led to a shift of paradigm within the curriculum reform process. The option we have adopted is the competence based approach through real life situations.

The syllabuses of the first cycle of Secondary General Education are broken down into 5 areas of learning, each of them containing a given number of disciplines as shown in the table below.

Areas of learning	Disciplines
1- Languages and Literature	- French - English - Living Languages II - Ancient Languages - Literature(in English and in French)
2- Science and Technology	- Mathematics - The Sciences(Physics, Chemistry, Technology, Life and Earth Sciences) - Computer Science
3- Social Sciences/Humanities	- History - Geography - Citizenship Education
4- Personal Development	- Sports and Physical Education - Manual Labour
5- Arts and National Cultures	- National Languages - National Cultures - Arts

For 4ème and 3ème (Francophone sub-system of education), the weekly workload and the quota as compared to the total number of hours on the time table (35 h) are displayed in the table below:

Domaines d'apprentissage	Volume horaire	Quota
Langues et Littérature	11 heures	31,42%
Sciences et Technologies	11 heures	31,42%
Sciences Humaines	06 heures	17,14%
Arts et cultures nationales	03 heures	08,57%
Développement personnel	03 heures	08,57%

For the Anglophone sub-system of education (Form III, Form IV and Form V) the same information is summarized in the table below:

Areas of learning	Weekly workload	Quota
Languages et Literature	11 hours	31,42%
Sciences et Technology	11 hours	31,42%
Social Sciences	06 hours	17,14%
Art, national languages and cultures	03 hours	08,57%
Personal development	03 hours	08,57%

L'Inspecteur Général des Enseignements

Dr Evelyne MPOUDI NGOLLE

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END - OF - FIRST CYCLE LEARNER'S EXIT PROFILE

The first cycle of Secondary General Education admits young graduates from primary schools aged between ten and fourteen. Its general objectives are not only to build intellectual, civic and moral skills in these children but also competences and fundamental knowledge which will either enable them to foster their education in the second cycle, or to prepare them for a smooth insertion into the job market after professional training.

Thus, within the framework of these new syllabuses, the learner is expected , after the first cycle of secondary education, to be able to use his/her competences to solve problems through family of situations relating to domains of life as indicated in the table below:

N°	Domains/Areas of life	Families of situations to be treated in the 1st cycle
1	Family and social life	• Participation in family life • Healthy professional relationships • Social integration
2	Economic life	• Discovery of income generating activities • Discovery of the job market, social roles, jobs and professions • Self confidence, aspirations, talents, self potential • Practising healthy eating habits
3	Environment , health and well being	• Preservation of the Environment • Quest for a healthy life style • Choosing and practising a healthy life style
4	Citizenship	• Mastery of rules and regulations governing the Cameroonian society • Discovery of cultural values and customs of the Cameroonian society
5	Media and Communications	• Discovery of the media world • Discovery of Information and Communication Technologies

In order to achieve these objectives, the learner should be able to mobilise , within the various disciplines and constructive areas of learning of the syllabuses, all the pertinent resources in terms of knowledge, know how and attitudes.

The next table gives you a general overview of the afore-mentioned objectives, while the syllabus for each subject unfolds, in details, all the expected competences per level and at the end of the 1st cycle.

Areas of Learning	Disciplines	Expected outcomes at the end of the 1st cycles
1-Languages and Literature	**Living languages:** English, French , German, Italian, Spanish, Chinese, Etc.	**French and English , L1** Receptive skills: reading and listening Read in an autonomous way, different types of texts related to areas of life as defined in the syllabus; Listen and understand various texts related to the above mentioned areas of life Productive skills: speaking and writing Produce various types of texts , of average length related to these areas of life; Language tools: appropriate use of various language tools in order to produce and read types of texts related to that level;
	English to Francophone learners French to Anglophone learners	Communicate accurately and fluently using all four basic skills in language learning; Be able to transfer knowledge learnt in class to real life situations out of the classroom; Be able to cope and survive in problem solving situations;
		Living languages II Receptive skills: reading and listening Read and understand simple texts on social life, citizenship, the environment, well being and health, media etc.. Listen and get oral information in order to simply interact during communication situations related the various domains of life. Productive skills: speaking and writing Sing, recite, dramatise , orally answer questions related to the various domains of life as defined in the syllabus; Write short passages on various familiar topics.

	Ancient languages: Latin, Greek **National languages** **Literature** Cameroon Literature; French Literature; Francophone Literature; Other literatures	Develop general knowledge through ancient languages and cultures; know the origins of the French language for linguistic mastery; Carry out elementary tasks in translation.
2-Science and Technology	Mathematics, The Sciences Computer Science	Use mathematic knowledge skills and values with confidence to solve real life problems within the different domains of life; Communicate concisely and unambiguously and develop power of mathematical reasoning (logical thinking, accuracy and spatial awareness).
		The Sciences: Acquire the fundamentals of sciences in order to understand the functioning of the human body, the living world, the earth and the environment; Acquire methods and knowledge to understand and master the functioning of technical objects made by man to satisfy his needs; Demonstrate attitudes to protect his/her health and environment.
		Computer Science : Master the basics of Information and Communication Technologies; Exploit and use ICTs to learn.
3- Social Sciences /Humanities	**History** **Geography** **Citizenship Education**	Possess cultural references to better locate events in time and space within a democratic system and become a responsible citizen. **History:** Acquire a common culture ; be aware of heritage from the past and current challenges; **Geography :** Develop one's curiosity and knowledge of the world; Get acquainted with landmarks to find your way and fit in the world.

		Citizenship Education: Possess essential knowledge in rights and duties in order to fulfil his/her citizenship.
4- Personal Development	**Moral Education;** **Home Economics;** **Sports and Physical Education** **Health Education**	Develop his / her physical abilities/skills ; Get ready for physical challenges , save and regain energy after physical efforts; Identify risk factors; possess basic knowledge and principles in hygiene and health education; Demonstrate a sense of self control and appreciate the effect of physical activities. Conceive and draw up sports and cultural animation projects; Acquire methods and develop a high sense of efforts; Conceive, draw up and implement projects that will enable one to project his/her image and feel the well being inspired by self-confidence.
5- Arts and National Cultures	**Arts/Artistic Education;** **National Cultures**	**Artistic Education:** Observe and appreciate works of art; Carry out an artistic activity; Gradually acquire the love for personal expression and creativity; Possess a mastery of creativity in music, plastic arts and the performing arts. Dramatise, recite texts (poems, tales, proverbs, etc.) relating to various areas of society; Practise the different dramatic genres: sketches, comedy, tragedy, drama, etc. **National languages and Cultures** Demonstrate a mastery of Cameroon cultures; Visit the various cultural areas of the country in order to discover their characteristics; Demonstrate a mastery of basic rules in writing Cameroonian languages as well as basic grammatical notions applied to these languages; Demonstrate a mastery of one of the national languages at 3 levels: morpho-syntax, reception and production of simple oral and written texts.

Even though the learners acquires skills in different disciplines, these competences are accompanied by other skills known as cross curricular competences related to intellectual, methodological, social and personal areas of learning.		
6- Cross curricular competences	Intellectual and Methodological domains	Solve Problem in a given situation; Use knowledge skills and values with confidence in order to solve real life problems within the different domains of life; With confidence, find useful information to solve problems he/she is faced with; Give his/her opinion ; Support his/her opinion with strong arguments ; Assess him/herself with a view to remediation; Demonstrate basic knowledge in note taking ; Conceive and realise individual projects; Analyse and summarise information, give feedback and report orally or in writing. Develop problem solving approaches; Exploit and use ICTs in his/her activities.
	Social and Personal Domains	Interact positively and assert his/her personality while respecting that of other people; Join team work, fit in a common initiative project /group; Demonstrate interest in cultural activities ; Develop a sense of effort, love for work, perseverance in tasks or activities carried out ; Understand and accept others in intercultural activities; Accept group assessment.

The resources to be mobilised by the learner are found in many disciplines and areas of learning. So it is important   to implement these syllabuses not in isolation but as interrelated subjects. These remarks hold both for subject and cross curricular competences. They are so called to show that they should be developed through teaching/learning activities of the different subjects. The development of subject and cross curricular competences

concern the entire education family as they are capable of inspiring an educative project and the putting in place of extracurricular activities. The ultimate training goal of these syllabuses, at the end of the first cycle, is to enable the learner to be self reliant, to be able to keep on learning throughout his/her life, to contribute to sustainable development and become a responsible citizen.

MATHEMATICS TEACHING SYLLABUS
FOR FORMS 3, 4 AND 5

LEARNING AREA:
SCIENCES AND TECHNOLOGY

SUBJECT: MATHEMATICS

Class: Form 3, form 4 and form 5

TOTAL NUMBER OF TEACHING HOURS FOR EACH LEVEL A YEAR: 104hrs

NUMBER OF PERIODS A WEEK: 4 of 50mins each (200 minutes)

COEFFICIENT: 4

TABLE OF CONTENTS

GENERAL PRESENTATION

In the first two years of secondary education, ground work was made through the consolidation of Mathematics taught in the primary school, involving the broadening of basic Mathematical skills, introduction of basic facts, principles and notions, all to prepare learners to pursue further studies in the subject and other related courses. The content for forms 3, 4 and 5, has been selected to ensure continuity and reinforcement of what was done in lower forms. All of mathematical knowledge and skills acquired in junior forms will serve as pre-requisite knowledge for students to construct new knowledge. At the end of form 5, students are well equipped to sit in for the General Certificate of Education (GCE) Ordinary level and any other examination requiring knowledge and skills at this level. The topics are grouped into modules. While it is convenient to break them down into these smaller manageable units, it is important to remember that they do not stand in isolation from one another.

The forms 3, 4 and 5 Mathematics syllabus is also elaborated using the Competency – Based – Approach from a situated perspective (through real life situations) as that of forms 1 and 2. As mentioned in the syllabus for forms 1 and 2, it is only in a situation that a person develops his/her competence. It is only by dealing effectively with this situation that a person can be declared competent. With this approach, Mathematical knowledge and skills learned in the classroom is made functional (act as tools (resources), to solve problems in other subjects and in real life situations. This syllabus therefore emphasizes application of Mathematics to real life situations and a practical approach to teaching and learning. The course has been designed to enable the learner to acquire attitudes, knowledge and skills which will be relevant to his/her life after school.

This syllabus for forms 3, 4 and 5, also has a double goal which is:

➢ The intellectual training of the learner to progressively develop abilities for experimentation, creativity and critical analysis so as to be able to take up fully, his role as a citizen.
➢ The second goal is utilitarian; here it envisages the adaptation of scientific knowledge to international economic and environmental context.

OUTCOMES OR PROFILES OF THE LEARNER

At the end of the first cycle, the learner who has successfully gone through this content should among others be able to use Mathematics with confidence to solve real life problems within the different domains of life, communicate concisely and unambiguously and develop power of mathematical reasoning (logical thinking, accuracy and spatial awareness). To be more specific they have to:
➢ Recognise, identify, write, communicate and use numbers in various ways;
➢ Use different operations to calculate values within different life situations;
➢ Extract, translate and use Mathematical information from tables, charts, graphs, diagrams, coded figures, or from any document and from the environment;

- Recognize, identify, describe and make geometrical shapes /forms, develop skills and accuracy as well as have confidence in the use of instruments for measuring and drawing and ability to visualize 3-dimensional figures;
- Acquire the methods and knowledge to understand and master the functioning of technical objects made by man to satisfy his needs;
- Meet up with the challenges of life through the use of scientific methods in solving real life problems;
- Appreciate the beauty of nature.

The Mathematics teaching syllabus for forms 3, 4 and 5 is designed so that teaching/learning at this level will continue to develop in learners the three fundamental competencies which are:
- Solve a problem within a situation (solve problems encountered within real life situations) so as to fully and autonomously assume role as a citizen;
- Display a logical reasoning (show a coherent logical reasoning, spirit of curiosity, spirit of critical thinking and initiative);
- Communicate using Mathematical language (communicate in an intelligent, clear and concise language orally or written).

These three competencies are developed progressively at all stages of secondary education through some real life activities.
The cognitive levels for forms 3 to 5 are knowledge, comprehension, application and simple cases of analysis and synthesis.

I – THE PLACE OF MATHEMATICS IN THE CURRICULUM AND ITS CONTRIBUTION TO THE LEARNING AREA.

Mathematics, offers different models and structures that constitute the framework of service tools in the Sciences and Technology learning area as well as in other learning areas through its own language. Mathematics in itself, contributes to the development of rigorous and logical reasoning, spirit of creativity and critical thinking. All these contribute to create, manage and exploit learning situations which help us to understand and master nature and laws of nature. Mathematics is at the root of all technological evolution of today's world and as such, it contributes significantly towards the modification of our environment, our life style and our thinking process. Mathematical concepts form the bases of the evolution of the computer that has considerably improved our work habits and communication.

II- DOMAINS OF LIFE AND CONTRIBUTION OF SYLLABUS TO DOMAINS OF LIFE:

The teaching/learning are constructed within five domains of life which are: Family and social life, Economic life; the environment, well- being and health; Media and communication, Citizenship. Mathematical skills help in developing competences in commercial transactions, games, planning expenditure, energy consumption, decision making, environmental protection, health, politics etc. As earlier mentioned, Mathematics is at the root of all technological evolution of today's world as it contributes significantly towards the modification of our environment, our life

style and our thinking process. Some application of Mathematics can be seen in business, trades, politics, census, family planning, arts and music etc. Thus, be it in the domain of family and social life, economic life, the environment, well-being and health, media and communication and even citizenship, Mathematics plays a significant role.

III-   FAMILIES OF SITUATIONS COVERED IN THIS PROGRAM OF STUDY

A family of situations refers to a group of life situations that share at least a common property.
For these years of secondary education five families of situations have been identified which are:
- Representation, determination of quantities and identification of objects by numbers;
- Organization of information, estimation of quantities and making choices in the consumption of goods and services;
- Representations and transformations of points and plane shapes within the environment;
- Usage of technical objects in everyday life;
- Description of patterns and relationships between quantities and ideas using symbols.

These five families of situations expose the learners to experience all possible daily life activities at this level such as Commercial transactions, games, planning expenditure, energy consumption, just to name a few. These are the areas to develop the envisaged competences. The different modules for this level are:.

a) COMPREHENSIVE TABLE SHOWING THE DIFFERENT MODULES FOR EACH CLASS

Level	Title of module	Family of situations	Duration
Form 3	Numbers, Fundamental Operations and Relationships in the sets of numbers and between elements in a set	Representation, determination of quantities and identification of objects by numbers	20
	Plane Geometry	Representations and transformations of points and plane shapes within the environment	24
	Solid figures	Usage of technical objects in everyday life	10
	Statistics and Probability	Organization of information, estimation of quantities and making choices in the consumption of goods and services	10
	Algebra and Logic	Description of patterns and relationships between quantities and ideas using symbols	40
Form 4	Numbers, Fundamental operations and relationships in the sets of numbers and between elements in a set	Representation, determination of quantities and identification of objects by numbers	24
	Plane Geometry	Representations and transformations of points and plane	44

		shapes within the environment	
	Algebra and Logic	Description of patterns and relationships between quantities and ideas using symbols	36
Form 5	Plane Geometry	Representations and transformations of points and plane shapes within the environment	44
	Solid figures	Usage of technical objects in everyday life	20
	Statistics and Probability	Organization of information, estimation of quantities and making choices in the consumption of goods and services	40

b) **PRESENTATION OF MODULES.**

As with the syllabus for forms 1 and 2, each module has two main parts: the introduction of the module and the table.
The introduction has the presentation of the module; the contribution of the module to outcome and curriculum goals, contribution of module to learning area and contribution of module to areas of living.
The table on the other hand, is made up of three main columns which are subdivided into seven columns:

- o The contextual framework embodies the families of situations and some examples of real life situations where the knowledge and skills (competences) can be applied. Teachers are expected to come out with more real life situations within their environment.
- o The Competences (competent actions) is divided into categories of actions and examples of actions: These are groups of some actions which are related to the mastery of the competences expected for the module.
- o The Resources have the essential or core knowledge which give all the set of cognitive and affective resources which the learner needs to mobilize to successfully treat a family of situations. It is divided into four components: the mathematical notions, the skills or know-how, attitudes to be disposed or to be acquired as well as other resources (material) necessary for the acquisition of these competences.

VII- PEDAGOGIC ORIENTATIONS.
a- Recommended Methodology:
The Competency-Based – Approach is based on the Socio-Constructivist view of learning which postulates that learners actively construct new learning onto old learning through an action in a given situation. In this light, the Mathematics lesson should have teaching/ learning activities and the teaching method being centered on the learner. Each teaching/learning sequence or lesson should include:
- o An introduction that will captivate and sustain the interest of the learners ;
- o One or two learning activities that will facilitate the acquisition of new knowledge and new skills. An activity that will consolidate old knowledge with new knowledge;
- o The essential knowledge is given as notion or methods;
- o Application exercises;

b- Integration activities whenever it is possible should be well planned so that it allows students to mobilize many skills learned to competently solve a real life problem. These integration activities are aimed at making the students to employ and use the learned mathematical skills necessary to competently handle life situations related to the family of situations for the module.

c- Evaluation.

In order to determine the learner's progress in the learning process, the teacher must regularly carry out assessment of learning. Knowledge and skills are evaluated as with objective based while the criterion referenced assessment is used to evaluate development of competences. At the end of form 5, students will sit in and write the General Certificate of Education examination, Ordinary level, in Mathematics. The nature and structure of the examination will be defined by the Cameroon GCE Board.

d- Notations and symbols

Teachers should teach for accuracy and should at each time ensure that students use notations and symbols encountered at this level, accurately. No misuse of words, notations and symbols by learners should be tolerated.

The teacher introduces progressively and whenever necessary the corresponding symbol for each set of numbers such as $\mathbb{R}, \mathbb{N}, \mathbb{Z}, \mathbb{Q}$.

e- Calculators

A calculator is a tool that is now very common among students. It fascinates and exercises an attraction that no other instrument seems to have had. Students use it even for the simplest operations. It is only a tool, and, is no substitute for the knowledge of its user. It is for the teacher to take note of this and encourage or discourage its use, as the case may be. The learners are expected to master the following keys (functions) of the calculator: $+, -, \times, \div, \pi, x^2, \sqrt{x}, \frac{1}{x}, x^y$, sine, cosine and tangent and their inverses in degrees and in decimals of a degree.

f- Geometry

The modules on geometry should not be left to be treated at the end of the academic year. The lessons on these modules will require a lot of well prepared students' activities. Accurate drawing using geometrical instrument is highly recommended. Correct use of notations and geometrical properties should be emphasized. Learners should master the different geometrical instruments and their uses. Geometrical constructions should be taught as activities for both teacher and students.

g- Management of modules

Each module is considered as a whole for that level. Teachers are advised to alternate numerical activities with geometrical activities.

h- Formulae, symbols and notations

Students should master among others, the following formulae:

Circumference of a circle = $2\pi r$, where r is radius of the circle	Volume of pyramid = $\dfrac{1}{3} base\, area \times height$
Curved surface of right circular cylinder = $2\pi rh$	Volume of right circular cone = $\dfrac{1}{3}\pi r^2 h$
Area of trapezium = $\dfrac{1}{2}(a+b)h$	Volume of sphere = $\dfrac{4}{3}\pi r^3$
Area of circle = πr^2	Sum of interior angles of a polygon with n sides = $(2n - 4)90°$ or $(n - 2)180°$
Area of a triangle = $\dfrac{1}{2}bc\sin A$ or $\dfrac{base \times height}{2}$, or $\sqrt{s(s-a)(s-b)(s-c)}$ where $s = \dfrac{a+b+c}{2}$	Solutions of $ax^2 + bx + c = 0$ is the formula $X = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Surface area of sphere = $4\pi r^2$	Determinant of the 2 by 2 matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is given by $ad - bc$.
Volume of cylinder = $\pi r^2 h$	Inverse of the 2 by 2 matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is given by $\dfrac{1}{ad - bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

Learners will meet and use among others, the following symbols and notations:

{ }	the set of	$\in$	is an element of
$n(A)$	the number of elements in the set A	$\notin$	is not an element of
$\{x: \ \}$	the set of all x such that	$\cup$	union
$\subset$	is a subset of	$\cap$	intersection
A'	the complement of the set A	$f(x)$	the image of x under the function f
$f:A\to B$	f is a function under which each element of set A has an image in set B	f^{-1}	the inverse relation of the function f

$f : x \mapsto y$	f is a function under which x is mapped onto y	fg	the function f of the function g
open interval on the number line closed interval on the number line	open interval on the number line closed interval on the number line	$\overrightarrow{AB}$ $\left\|\overrightarrow{AB}\right\|$	the vector $\overrightarrow{AB}$ Magnitude of vector $\overrightarrow{AB}$
[a, b]	the interval $\{a \leq x \leq b\}$	**a**	the vector **a**
[a, b]	the interval $\{a \leq x \leq b\}$		
[a, b)	the interval $\{a \leq x < b\}$	~p	not p
(a, b)	the interval $\{a < x < b\}$	$p \Rightarrow q$	p implies q
[AB] AB	Line segment from A to B. Length of [AB]	$p \Leftrightarrow q$	p implies and is implied by q (p is equivalent to q)

MATHEMATICS TEACHING SYLLABUS FOR FORMS 3, 4 AND FORM 5

MODULE N° 10

NUMBERS, FUNDAMENTAL OPERATIONS AND RELATIONSHIPS IN THE SETS OF NUMBERS AND BETWEEN ELEMENTS OF A SET.

CREDIT: **20** / 4periods of 50mins a week

PRESENTATION OF MODULE

This module is aimed at making the learner competent within the families of situations '**Representation, determination of quantities and identification of objects by numbers'**. It has the following as categories of action: Determination of a number, reading and writing information using numbers, verbal interaction on information containing numbers and estimation and treatment of quantities.

This module will permit the learner to apply all what was acquired in forms 1 and 2 under numbers and sets of numbers and extend it to evaluate measures involving large numbers arising in branches of science, recognize and represent these large numbers using indices.

This module is introduced by indices and logarithms, then sets of numbers ($\mathbb{N}$, $\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{R}$), set theory and ends with arrangement of information into rectangular arrays called matrices. In this module learners get to discover very exciting number patterns and properties.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOALS

This module contributes to a good mental structure that will permit the learner to react competently in different life situations as well as be able to communicate concisely and precisely using numbers. Learners will be able to recognize, describe and represent numbers and their relationships and to count, estimate, calculate and check with competence and confidence in solving problems. Translate set language into ordinary English and vice versa, describe and extend pattern to solve problems.

CONTRIBUTION OF MODULE TO LEARNING AREA

The mastery of this module equips the learner with basic knowledge and skills (know -how) on which further learning in Mathematics and the pure sciences will be based. It will also equip learners with basic know-how needed in other school subjects such as the human sciences, commercial education etc. Indices, logarithms and their graphs for example, are used in other subjects such as calculation of growth rate of seedlings or bacteria in biology, population growth in geography, pH of a solution in chemistry, rate of decay with radioactive substances in Physics etc. Matrices are used in treating networks and eventually for the solution of simultaneous equations.

CONTRIBUTION OF MODULE TO AREAS OF LIVING

This module provides the opportunities for the learners to represent very large numbers in index form thus gaining time and space and also for easy understanding or appreciation of its value. Graphs of logarithmic and/or exponential functions are used for economic applications such as simple and compound interest, annuities etc. Record inventory or data in matrix form will help for easy calculation of stock. The learner with a good sense of number and operations with numbers has the mathematical confidence to make sense and meaning in various contexts. These knowledge and skills will contribute in the management of family finances; implication in different monetary transactions, etc justifies its importance in consumption and production of goods and services, social, economic and environmental issues, welfare and health, citizenship, media and communication.

TABLE 10: NUMBERS, FUNDAMENTAL OPERATIONS AND RELATIONSHIP IN THE SET AND BETWEEN ELEMENTS OF A SET.

FORM 3

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Examples of actions	Core knowledge	skills	Attitudes	other resources
Representation, determination of quantities and identification of objects by numbers.	-Find the number of bacteria in a certain bacterial culture; -Find total value of an investment at the end of a defined period; -Calculate the amount to be paid at each installment -Daily movements (distance, time); -Planning a meal; -Use of public and private services; -Communicate using numbers; -Read water and electricity bills -Calculate bills	Numerical methods The language of set Verbal interaction on information containing numbers Representation and treatment of information and quantities	-Find the pH of substances; -Record population growth; -Find the interest on an amount invested; -Calculate stock of material in a warehouse -Find number of bags of farm products -Record and store results, -Give test results in some subject over a period of time; -Evaluate the number of points obtained by a team in a football league	**Sets** The sets of numbers $\mathbb{N}, \mathbb{Z}, \mathbb{Q}, \mathbb{R}$ -Set of numbers and operations in these sets -Place value - **Set language and notations**: -Finite and infinite sets; universal set, null set, singleton set; -Cardinality of finite sets, -Subsets -Intersection and union of sets -Complement of a set -Equal and equivalent sets -Power set with finite set of cardinality not more than 3 -Venn diagrams	-Define and identify the sets $\mathbb{N}, \mathbb{Z}, \mathbb{Q}, \mathbb{R}$ -Carry operations in each set; -Use set notations, -Transcribe set language to ordinary English and vice versa, -Solve real life problems involving set theory, -Find cardinality of a set, -Differentiate between equal and equivalent sets -Find the number of subsets for finite set; -Find power set for finite set; -Draw and use Venn diagrams	-Accurate and rapid writing of very large and very small numbers; -Good sense of numbers; -Confident; -Good sense of estimation and approximation -Good sense of orderliness	Documentation (internet) Calculator Material for low scale activity Textbooks Set of objects Recorded data on events Place value chart

TABLE 10: NUMBERS, OPERATIONS AND RELATIONSHIP IN THE SET AND BETWEEN ELEMENTS OF A SET (Cont)

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Examples of actions	Core knowledge	skills	Attitudes	other resources
Representation, determination of quantities and identification of objects by numbers.	-Find the number of bacteria in a certain bacterial culture; -Find total value of an investment at the end of a defined period; -Calculate the amount to be paid at each installment -Daily movements (distance, time); -Planning a meal; -Use of public and private services; -Communicate using numbers; -Read water and electricity bills -Calculate bills	Numerical methods The language of set Verbal interaction on information containing numbers Representation and treatment of information and quantities	-Find the pH of substances; -Record population growth; -Find the interest on an amount invested; -Calculate stock of material in a warehouse -Find number of bags of farm products -Record and store results, -Give test results in some subject over a period of time; -Evaluate the number of points obtained by a team in a football league	**Indices and logarithms** -Laws of indices -Simple equations involving indices -Introduction to logarithms, - log base 10 and some common logs, -Logarithmic notations, -laws of logarithms	-State and apply laws of indices, -Solve simple equations involving indices -State and apply laws of logs to simple log expressions and equations, -Perform operations in bases other than 10, -Find the values of numbers given in index form or in log form, -Solve simple logarithmic equations	-Accurate and rapid writing of very large and very small numbers; -Good sense of numbers; -Confident; -Good sense of estimation and approximation -Good sense of orderliness	Documentation Calculator Material for low scale activity Textbooks (Electronic and paper back) Set of objects Recorded data on events Place value chart

TABLE 10: NUMBERS, OPERATIONS AND RELATIONSHIP IN THE SET AND BETWEEN ELEMENTS OF A SET (Cont)

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Examples of actions	Core knowledge	skills	Attitudes	other resources
Representation, determination of quantities and identification of objects by numbers.	-Find the number of bacteria in a certain bacterial culture; -Find total value of an investment at the end of a defined period; -Calculate the amount to be paid at each installment -Daily movements (distance, time); -Planning a meal; -Use of public and private services; -Communicate using numbers; -Read water and electricity bills -Calculate bills	Numerical methods The language of set Verbal interaction on information containing numbers Representation and treatment of information and quantities	-Find the pH of substances; -Record population growth; -Find the interest on an amount invested; -Calculate stock of material in a warehouse -Find number of bags of farm products -Record and store results, -Give test results in some subject over a period of time; -Evaluate the number of points obtained by a team in a football league	**Matrices** -Representation, Order, types, equality, equivalent matrices; -Addition and subtraction of matrices; -Multiplication of matrix by a scalar and by another matrix; -Determinant of a 2 by 2 Matrix; -Special matrices (singular, identity, null); - Transpose of a matrix	-Represent information in matrix form; -State order of a matrix; -Add, subtract matrices; -Multiply a matrix by a scalar and a matrix by another matrix; -Identify some types of matrices; -Find the determinant of a 2 by 2 matrix, -Find the transpose of a matrix; -Identify an identity matrix	-Accurate and rapid writing of very large and very small numbers; -Good sense of numbers; -Confident; -Good sense of estimation and approximation -Good sense of orderliness	Documentation Calculator Material for low scale activity Textbooks Set of objects Recorded data on events Place value chart

MODULE N° 11

PLANE GEOMETRY.

CREDIT: **24** / 4 periods of 50mins

GENERAL PRESENTATION

All what was done from points, lines, plane figures, angles, metric system form basic knowledge and skills necessary to continue this module on geometry. This module therefore, begins with congruency and similarity and looking more on congruent plane figures and similar plane figures, starting with triangles. Vectors in 2-dimension is introduced here and the last part deals with some trigonometry.

This module is within the families of situations: **Representations and transformation of plane shapes within the environment.** Three categories of actions are involved namely: Perception of the physical environment, production of plane shapes and transformation of the physical environment and determination of measures.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOALS

This module will help learners to understand the conditions for congruency in plane figures and similarity in plane figures. It will continue to improve upon learners' understanding and appreciation of pattern, precision and beauty in natural and cultural forms. Learners will also develop the ability to visualize measure, represent, describe and compare plane figures in the environment, use vector methods to solve problems and associate vectors to people and things in motion, use sine, cosine or tangent in right-angled triangles to determine distances. In addition, learners will develop the sense of order, rigour in working, ability to represent, accuracy and sense of precision and initiation to scientific method in handling life situations. The ability to construct will help learners to be able to represent and interpret the physical environment and also be able to investigate and model situations in the environment. As a result, they will be able to make sensible estimates, verify results, measure accurately, locate positions in real life as well as be alert to the reasonableness of measurements and calculation results.

Critical thinking, creativity and sense of initiative that learners will also develop are attitudes that will contribute to make a citizen autonomous and responsible in carrying out his social roles.

CONTRIBUTION OF MODULE TO LEARNING AREA

Plane geometry is one of the main parts of the Mathematics syllabus due to the expected learning outcome. Measuring in general relates directly to the scientific, technological and economic world of the learner. Accurate measuring and calculations involving lengths, angles and areas, representations and descriptions are an integral part of chemistry, Biology, Physics and other parts of

Mathematics. Situations of congruency and similarity are seen in Biology, Chemistry and also in the cultural environment of the learners. The learning of plane geometry provides the basic knowledge and skills needed to study 3-dimensional geometry. The third category of actions shows interaction between numerical activities and geometrical activities.

CONTRIBUTION OF MODULE TO AREAS OF LIVING
The study of the module enables the learners to:

- Develop the ability to visualize, reason and justify,
- Interpret, understand, classify, appreciate and describe the world through 2-dimensional shapes, their locations, movement and relationships.

By these, they should be able for example to use national flags to demonstrate transformations and symmetry in designs; investigate and recognize the geometrical properties and patterns existing in traditional and modern architecture; use maps in geography as specific forms of grid and also investigate geometric patterns in art.

The areas of living for which knowledge and skills from this module are directly applied are: Family and social life, Economic life, Environment, welfare and health, citizenship, media and communication. The learner each uses or comes across objects from which geometrical shapes can be identified. The outline of figures which are the lines, angles, planes and their intersections are what constitute the physical environment for they are the bases for which real life subjects are constructed.
The study of size, distances, and position of objects in the environment is important since it will provide a language for describing and representing the physical environment and methods for analyzing and drawing conclusions about real life phenomena.
Symmetry contributes in the study of the rules and principles of art and the appreciation of the beauty and taste.

TABLE 11: PLANE GEOMETRY. FORM 3

Contextual framework		Competences Action		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Representations and transformation of plane shapes within the environment	-Painting and tilling -Draw model of a building -Travelling -Demarcation of land boundaries -Housing in an estate -Putting a ceiling -Art or design -Designing a sport complex -Mapping a town -Building -Surveying	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine measure of similar containers -Constructing houses of same size and type; -Cut out into similar shapes; -Carpeting and putting a ceiling -Displacing a log of wood using a crobar -Draw a motive for decoration -Find area of a theatre stage -Draw the plan for a house -Find height of a building or of a flag pole or of a radio aerial -Find distance	**Plane geometry** -Congruency and congruent plane figures; -Congruency in triangles (SSS, SAS, ASA, RHS) -Similar plane figures -Similar triangles -Constant of proportionality -Areas and volume of similar figures -Thales property and its converse -Application of similarities to areas of similar figures	-State and use conditions for two triangles to be congruent or similar, **-**Apply knowledge of congruency and similarity to real life situations -Identify congruent figures and similar figures in the environment -Construct similar figures; -Compare areas of similar figures -State and use Thales property; -Use ratio of corresponding sides to find the area of similar plane figures -Apply the notion of scale factor to real life situations.	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	Metre rule Tape measures of different lengths Similar shapes cut out from cardboard Geometrical instrument Models -Set square Graph board -Calculator

Contextual framework		Competences Action		Resource			
Family of situations	**Examples of situations**	**Categories of actions**	**Actions**	**Core knowledge**	**Skills**	**Attitudes**	**Other resources**
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent -Draw model of a building -Travelling -Demarcation of land boundaries -Putting a ceiling -Art or design -Designing a dress -Mapping a town -Building -Surveying	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine measure of similar containers -Constructing houses of same size and type; -Cut out into similar shapes; -Carpeting and putting a ceiling -Displacing a log of wood using a crobar -Draw a motive for decoration -Draw the plan for a house -Find height of a building or of a flag pole or of a radio aerial -Find distance	**Vectors in 2-dimension** -Scalar and vector quantities -Notations and representation -Position vectors -Free vectors, localized vectors -Magnitude, direction and sense of a vector -Equal vectors -Operation with vectors **Trigonometry** -Right- angled-triangle -Pythagoras' theorem -Trigonometric ratios for acute angle -Sine and cosine of complementary angles -Relationship between tan, sin and cos of an angle; -Use of calculators	-Differentiate vector and scalar quantities, -Notate vectors and represent vectors in different ways, -Find the magnitude or norm of a vector, -Distinguish between free and position vectors -Carry out vector addition, subtraction and multiplication by a scalar quantity -Define trig ratios for special angles (30^0, 45^0, 60^0 90^0) -Use calculators to determine trigonometric ratios -State and use Pythagoras theorem -Use trig ratios to solve real life problems	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	Metre rule Tape measures of different lengths Similar shapes cut out from cardboard Geometrical instrument Models -Set square -Graph board -Calculator

MODULE N° 12

SOLID FIGURES.

CREDIT: **10hours** / 4 teaching hours a week

GENERAL PRESENTATION

This module deals with description, recognition, identification and representation of the sphere, cone, pyramid and the prism. This module is within the family of situations: **Usage of technical objects in everyday life**. The categories of actions identified for this module are: Recognition of objects; production of objects; determination of measures. In school, at home and in the market place or on a journey, students encounter different shapes, as such the description and representation of these shapes throughout the module are expected to be treated in context.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOAL

The study of geometry and 3-dimensional geometry in particular helps in the construction of reasoning, description and calculation techniques. As with plane geometry, the study of solids will enable the learner to develop the ability to visualize, interpret, calculate relevant values, reason and justify, classify, appreciate and describe the world through 3-dimensional objects. It will focus on the properties, relationships, orientations, positions and transformations of 3-dimensionsl objects. They will also develop the spirit of initiative, creativity and enterprise, the development of arts such as painting and drawing as well as the development of aesthetic values. All these competences contribute in becoming autonomous and independent in carrying out different activities in the environment which is full of manmade and natural objects.

CONTRIBUTION OF MODULE TO LEARNING AREA

Measuring in general is used greatly in the sciences, the technological and economic world of the learner. Accurate measuring and calculations involving volume or quantity in general, are part of real life. The competences developed by learners here are fundamental to the mastery of other science subjects such as Biology, Physics, Chemistry and other parts of Mathematics.

CONTRIBUTION OF MODULE TO AREAS OF LIVING

As was mentioned earlier with plane geometry, the study of this module enables the learners to:

- Develop the ability to visualize, reason and justify,
- Interpret, understand, classify, appreciate and describe the world through 3-dimensional shapes, their locations, movement and relationships.

By so doing, they should be able for example to use national flags to demonstrate transformations and symmetry in designs; investigate and recognize the geometrical properties and patterns existing in traditional and modern architecture; use maps in geography as specific forms of grid and also investigate geometric patterns in art.

The different areas of living for which we see direct application of the competences from this module are: Family and social life, Economic life, Environment, welfare and health as well as Media and communication. The study of this module also provides a language for describing the physical world and gives the methods for analyzing and drawing conclusions about real world phenomena which subsequently go to improve understanding of the patterns, precision, achievement and beauty in natural and cultural forms.

TABLE 12: SOLID FIGURES. FORM 3

Contextual framework		Competences		Resource			
Family of situations	**Examples of situations**	**Categories of actions**	**Actions**	**Core knowledge**	**Skills**	**Attitudes**	**Other resources**
Usage of technical objects in every day life.	-Roofs -Tents -Works of arts -Balls -Satelites -Baking dishes -Bokaroos	Recognition of objects Production of objects Linking volume to capacity Determination of measure and how much an object can contain	-Describe solids in the environment -Identify objects described by somebody -Production of spherical objects -Setting up a tent -Constructing special roofs -Compare capacity or volume of two containers -Determine the volume of water a tank can contain	**Mensuration** -Sphere, -Description and identification, -Surface area and volume; -Cone, pyramids, prisms: Area of surface and volume -Frustum	-Identify a sphere; -Describe a sphere ; -Give example of a sphere in real life; -Draw a sphere -Calculate surface area and volume of a sphere; -Find surface area and volume of cones, pyramid, prisms and frustum -Draw or make nets of each type of solid -Distinguish between prism and pyramid -Find ratio of surface area and volume of similar figures.	-Sense of organization -Sense of initiative -Precision in calculation -Ability to visualize -Sense of appreciation -Creativity -Spirit of enterprise	-Calculator -measuring instrument -concrete objects -Models of the different shapes -Cardboard -Containers -Manila paper -Geometrical instrument

MODULE N° 13

CREDIT: **10 hours**　／　4 teaching hours a week

GENERAL PRESENTATION

This module deals with representation of data from real life situations in different forms (frequency table, pictogram, bar chart, histogram, pie chart) and possible interpretations. With the study of data handling, the learners will develop the skills to collect, organize, display, analyse and interpret information. This model is within the family of situations '**Organization of information and estimation of quantities'** and has as categories of actions: Collection, organization and exploitation of information; Interpretation of results.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOALS

This module will help learners collect, process and interpret data and understand, estimate and use probabilities. It will also develop in learners the sense of organization, precision and good judgment. Learners will be able to access information in a single database. Use appropriate language to justify decisions. These attitudes will help the learner to be able to take up duties as a member of the family, make informed decisions, and develop autonomy in the production and consumption of goods and services. They will make sense of data after collecting, organizing and interpreting, drawing conclusions and making predictions. They will use mathematics effectively and critically showing responsibility towards the environments and health of others.

CONTRIBUTION OF MODULE TO LEARNING AREA.

Great deal of research work in science and technology (health and technological products etc) and other learning areas such as Economics and Geography are represented in statistical form.

CONTRIBUTION OF MODULE TO AREA OF LIVING

Information in statements, graphs, tables and charts are presented to us daily through television, radio, news papers or any other form of media and communication. This information could be on crime rates, rainfall, sport results, election polls, government spending, rate of infant mortality, population or economic growth. The interpretation of this data after analyzing will lead learner to meaningful participation in political, social and economic activities. The learners will develop a sense of how mathematics can be used to: manipulate data to represent or misrepresent trends and pattern, provide solutions that can sustain or destroy the environment, promote or harm the health of others, understand distribution of resources etc. Through the study of chance on the

other hand, the learner will develop skills and techniques for making informed choices and coping with randomness and uncertainty. Applications of competences within this module are found in the areas of living: Family and social life, Economic life, citizenship, media and communication. Within these areas, collection, organization, displaying and interpretation of simple data by the learners are essential skills that will help them to assume their positions as responsible members of a family, make good choices on what to consume (information, goods, services), participate meaningfully in basic economic activities, be able to show high level of responsibility towards the environment, be able to provide solutions that can improve the environment and will be able to judge economic trends and patterns.

TABLE 13: **STATISTICS AND PROBABILITY. FORM 3**

Contextual framework		Competences Action		Resource			
Family of situations	**Examples of situations**	**Categories of actions**	**Actions**	**Core knowledge**	**Skills**	**Attitudes**	**Other resources**
Organization of information and estimation of quantities in the consumption of goods and services	-Census of a population by some characteristics such as sex, age group, profession, religion etc. -Demographic growth -Classification of football teams -Opinion polls on a new product or new policy -Evolution of the budget of a country due to economic growth	**organization, presentation and exploitation of information** **Interpretation of results** **Taking chances**	-Record yearly rainfall -Record production of crude oil by some countries -Compile results (exams, elections etc) -Make a choice -Result of football matches -Display a month's sales by a shop -Compare production or events -Forecast weather or election result -Record number of accidents by motor bike -Choose a career,	**Statistics** -Representation of data: bar chart , pie chart, -Frequency distribution table for ungrouped and grouped data of equal and class width -Measures of central tendency for ungrouped data Mean, mode, modal class, median -Histogram for grouped data of equal class width **Probability** -Sample space, events -Probability of an event -Equiprobable events	-Draw up frequency distribution tables -Represent data using either bar chart, pie chart or histogram, -Read and interpret data from charts, -Find class width, mid class value or class centre; -Find measures of central tendency for given data -Construct Histogram for grouped data -Find sample space -Find probability of an event -Appreciate probability scale	-Sense of organization; -Precision -Sense of good judgment -Critical thinking -Vigilant -Patient -Politeness	-Calculator -Graph board -Data from environment -Charts illustrating various presentation of data -News paper -Computer Statistics from National department of statistics -Students

MODULE N° 14

ALGEBRA AND LOGIC.

CREDIT: **40hours** ／ 4periods of 50mins a week

GENERAL PRESENTATION

Algebra focuses on describing pattern and relationships between variables through the use of symbolic expressions, graphs and tables. This module is the extension of basic algebra and starts here with transposition of formulae then to introducing relations and functions. Functions, relations, equations, inequalities, systems of equations and graphs are examples of models. This module is made up of the families of situations: **Describing patterns and relationships between quantities using symbols**. There are three categories of action namely: Interpretation of algebraic models; determination of quantities from algebraic models; representation of quantities and relationships.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOALS

The mastery of this module will help the learner to solve problems using algebraic language and skills and also to examine and study relationships between real life situations. Through the use of symbolic expressions, graphs and tables, learners will be able to recognize, describe and represent patterns and relationship as well as translate real life problems into different forms of equations to solve. Logic being Mathematical reasoning will help learners develop the skill of logical reasoning 5deductive and inductive), spirit of critical thinking for proper decision taking.

CONTRIBUTION OF MODULE TO LEARNING AREA

Algebra is the language for investigating and communicating most of Mathematics, sciences and technological work. Formulae are highly used in natural sciences (calculating air pressure, resistance, voltage), and in economic growth such as calculating pension for those on retirement etc. Learners will achieve efficient manipulative skills in the use of algebra, and a thorough understanding of these is essential for understanding any field of mathematics and many technical areas where mathematics is applied. This module is a foundation for more advanced mathematics, science and technology in general.

CONTRIBUTION OF MODULE TO AREAS OF LIVING

The areas of living where this module is employed are: Family and Social life, Economic life, Environment, Welfare and health; Citizenship, Media and Communication. Learners develop the competences of translating phrases and sentences in real life into variable expressions and equations to find solutions. They will use algebraic language and skills to describe patterns and relationships in a way that builds awareness of other learning areas as well as issues related to human rights, social economic

life, cultural life, political and environmental issues. Many real-world phenomena can be modeled by relations such as: the time a satellite takes to complete a revolution around the earth in terms of its speed and altitude; with finances to find simple interest I earned on an investment P after a period of time t at a rate r, is given as I = Prt. Therefore, in other subject areas, as well as in real life, connections are made between algebraic representations and the problem situations so as to provide better understanding about Mathematical concepts and the different problem situations. Learners will be able to manipulate graphs in media to represent trends and pattern, represent relationships within an ecosystem, exploit and design geometrical patterns in art and architecture and appreciate symmetrical patterns that occur in nature.

TABLE 14:   ALGEBRA AND LOGIC. FORM 3

Contextual framework		Competences Action		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Describing patterns and relationships between quantities using symbols.	-Travelling -Marketing -Construction -Saving -Hiring -Currency exchange -Planning a meal -Agriculture -Politics -Family ties -Social ties	**Interpretation of algebraic models** **Determination of quantities from algebraic models** **Representing quantities and relationships**	-Determine the relationship between the area of a rectangular garden and its sides -Find expenses or cost or total cost for an event ; -Find profit on a given sale -Find income for a given business enterprise -Determine the number of articles bought from the total cost; -Find change in prices -Express the cost of renting a car in terms of number of hours or days and caution; -Write total amount spent in terms of unit cost and number of articles; -Indicate the distance covered by a car in terms of speed and time. -Justify a result	**Simple Algebra** -Algebraic expressions -Expansion -Factorisation -Simple linear equations, - Linear simultaneous equations, -Quadratic equations **Logic** -Propositions -Conjunction, disjunction, negation -Truth value, -Implications, -Bi-implications, -Truth tables -Compound statements and the conditionals -Logical equivalent -Operators and laws of logic.	-Expand $(a \pm b)^2$ and $(a+b)(a-b)$; -Factorise 4 terms expressions and expressions of the form: $a^2 - b^2$, $ax^2 + bx + c$ with $a \neq 0$; -Solve simple linear equations; -Solve quadratic equations by factorization and by formula -Solve linear simultaneous equations by substitution and by elimination -Build and solve equations from real life problems -Draw up truth tables -Use logic connectives, -understand the concept of De Morgan's law.	-Awareness; -Sense of generalisation -Ability to infer -Ability to justify -Logical reasoning -Creativity -Sense of representing	-Documents -Calculator -overhead projector -Graph boards -micro computer

TABLE 14: ALGEBRA AND LOGIC. FORM 3 (Cont)

Contextual framework		Competences Action		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Describing patterns and relationships between quantities using symbols.	-Travelling -Marketing -Construction -Hiring -Predict amount of growth -Currency exchange -Planning a meal -Agriculture -Politics -Family ties -Social ties	**Interpretation of algebraic models** **Determination of quantities from algebraic models** **Representing quantities and relationships**	-Determine the relationship between the area of a rectangular garden and its sides -Find expenses or cost or total cost for an event ; -Find profit on a given sale -Find income for a given business enterprise -Determine the number of articles bought from the total cost; -Find change in prices -Express the cost of renting a car in terms of number of hours or days and caution; -Write total amount spent in terms of unit cost and number of articles; -Indicate the distance covered by a car in terms of speed and time. -Justify a result	**Transposition of formulae and variations** -Direct variation; -Inverse variation; -Joint variation; -Constant of proportionality -Graphs of direct and inverse variations	-Rewrite or rearrange a formula by changing the subject -Give examples of direct or inverse variations; -Use variations to solve real life problems; -Draw graphs to illustrate direct proportions, -Translate situations of variations into mathematical statements and solve;	-Awareness; -Sense of generalisation -Ability to infer -Ability to justify -Logical reasoning -Creativity -Sense of representing	-Documents -Calculator -overhead projector -Graph boards -micro computer

TABLE 14: ALGEBRA AND LOGIC. FORM 3 (Cont)

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Describing patterns and relationships between quantities using symbols.	-Travelling -Marketing -Construction -Hiring -Currency exchange -Planning a meal -Agriculture -Politics -Family ties -Social ties	**Interpretation of algebraic models** **Determination of quantities from algebraic models** **Representing quantities and relationships**	-Determine the relationship between the area of a rectangular garden and its sides -Find expenses or cost or total cost for an event ; -Find profit on a given sale -Find income for a given business enterprise -Determine the number of articles bought from the total cost; -Find change in prices -Express the cost of renting a car in terms of number of hours or days and caution; -Write total amount spent in terms of unit cost and number of articles; -Indicate the distance covered by a car in terms of speed and time. -Justify a result	**Relations and functions** -Relations between two sets; -Relations in a set, -Types of relations in a set; -Cartesian product of 2 finite sets, -Properties of relations in a set, -Equivalent relations -Functions and mapping, notation, domain, image, codomain, range, -Types of mappings Surjective, injective mapping -Inverse function, composite function -use of flow diagrams	-Find Cartesian product of two finite sets; -Draw papy charts or arrow diagrams ; -Verify the properties of a relation; -List elements of a Cartesian product; -Distinguish the various types of mapping (one-to-one, etc); -Identify onto and into mappings; -Find the image of an element for a given function; -Find inverse of a function; -Show that a relation is an equivalent relation or not. -Find the composite of two functions.	-Awareness; -Sense of generalisation -Ability to infer -Ability to justify -Logical reasoning -Creativity -Sense of representing	-Documents -Calculator -overhead projector -Graph boards -micro computer

FORM 4

MODULE N° 15

NUMBERS, FUNDAMENTAL OPERATIONS AND RELATIONSHIPS IN THE SETS OF NUMBERS AND BETWEEN ELEMENTS OF A SET.

CREDIT: **24hours** / 4 periods of 50mins a week

PRESENTATION OF MODULE

This module is aimed at making the learner competent within the families of situations '**Representation, determination of quantities and identification of objects by numbers'**. It has the following as categories of action: Determination of a number, reading and writing information using numbers, verbal interaction on information containing numbers and estimation and treatment of quantities.

This module starts with estimates and approximations, writing numbers in standard form and extends to surds, indices and basic logarithms then ends with matrices.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOALS

This module contributes to a good mental structure that will permit the learner to react competently in different life situations as well as be able to communicate concisely and precisely expressing large numbers and giving a realistic estimate of a quantity.

CONTRIBUTION OF MODULE TO LEARNING AREA

The mastery of this module equips the learner with basic knowledge and skills (know -how) on which further learning in Mathematics and other school subjects especially in the sciences will be based. Decimal numbers are used in the sciences for measuring, weighing and also for the evaluation of quantities.

CONTRIBUTION OF MODULE TO AREAS OF LIVING

This module provides the opportunities for the learners to engage with the historical development of numerical counting and writing system. Mastery of the concepts of equality, inequality, the basic operations (+, -, ×, ÷) and their effects on numbers, percentages and situations of proportionality are fundamental tools a learner will need in real life and throughout life. These skills will contribute in the management of family finances; implication in different monetary transactions, etc justifies its importance in consumption and production of goods and services, social, economic and environmental issues, welfare and health, citizenship, media and communication.

TABLE 15: NUMBERS, OPERATIONS AND RELATIONSHIP IN THE SET AND BETWEEN ELEMENTS OF A SET.   FORM 4

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Examples of actions	Core knowledge	Skills	Attitudes	other resources
Representation, determination of quantities and identification of objects by numbers.	-Find the number of bacteria in a certain bacterial culture; -Measurements; -Find total value of an investment at the end of a defined period; -Calculate the amount to be paid at each installment -Daily movements; -Planning a meal; -Use of public and private services; -Communication using numbers (tel numbers, car number plates)	Numerical methods Verbal interaction on information containing numbers Representation and treatment of information and quantities	-Give an approximate number of seats in a stadium; -Measure the heights at the identification centre; -Take the mass of patients in the hospital; -Determine the amount at stake for a transaction; -estimate number of bags of farm products; - Record results of sporting activities -Find pH of a solution; -Record and store information.	**Estimation, Approximation and errors** -Degree of accuracy: rounding up, rounding down (nearest whole number, tenth, ten, hundredth etc); -Calculation involving approximation -Place value -Value of a digit -Significant figure -Standard form, $A \times 10^n$, where $n \epsilon \mathbb{Z}$ and $1 \le A < 10$ -Absolute error, relative error, percentage error -Maximum and minimum values from a given approximation	-Correct a number to a given degree of accuracy; -Express number to a given number of significant figures; -Write numbers in standard form -Give value of a digit in a given number; -Make reasonable approximations and estimates of quantities and measures; -Find maximum and minimum values -Find maximum and minimum errors from calculations and measurements	-Accurate and rapid writing of very large and very small numbers; -Good sense of numbers; -Confident; -Good sense of estimation and approximation -Good sense of orderliness	Documentation Calculator Tape for measuring Material for low scale activity Textbooks Real life situations such as results of mountain race, long jump, triple jump etc pH metre and chart; Thermometre

TABLE 15: NUMBERS, OPERATIONS AND RELATIONSHIP IN THE SET AND BETWEEN ELEMENTS OF A SET. (Cont)

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Examples of actions	Core knowledge	skills	Attitudes	other resources
Representation, determination of quantities and identification of objects by numbers.	-Find the number of bacteria in a certain bacterial culture; -Measurements; -Find total value of an investment at the end of a defined period; -Calculate the amount to be paid at each installment -Daily movements; -Planning a meal; -Use of public and private services; -Communication using numbers (tel numbers, car number plates)	Numerical methods Verbal interaction on information containing numbers Representation and treatment of information and quantities	-Give an approximate number of seats in a stadium; -Measure the heights at the identification centre; -Take the mass of patients in the hospital; -Determine the amount at stake for a transaction; -estimate number of bags of farm products; -Record results of sporting activities -Find pH of a solution; -Record and store information.	**Surds, Indices and Logarithms** -Rational and irrational numbers -Surds and surd forms, -Simplification of surds. -Rationalization of denominator of expressions $\dfrac{a}{\sqrt{b}}$ where a, b $\in + \mathbb{R}$ -Indices, laws of indices, -Change of base; -Simple exponential equations; -Laws of logarithms, -Simple logarithmic equations.	-Differentiate rational and irrational numbers; -Simplify expressions with surds; -Rationalize the denominator of surd expressions; -Apply laws of indices; -Solve simple exponential equations; -Apply properties of indices to find values; -State and apply properties of Logarithms to find quantities; -Change logarithmic expressions from one base to another	-Accurate and rapid writing of very large and very small numbers; -Good sense of numbers; -Confident; -Good sense of estimation and approximation -Good sense of orderliness	Documentation Calculator Tape for measuring Material for low scale activity Textbooks Real life situations such as results of mountain race, long jump, triple jump etc pH metre and chart;

TABLE 15: NUMBERS, OPERATIONS AND RELATIONSHIP IN THE SET AND BETWEEN ELEMENTS OF A SET. (Cont)

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Examples of actions	Core knowledge	skills	Attitudes	other resources
Representation, determination of quantities and identification of objects by numbers.	-Find the number of bacteria in a certain bacterial culture; -Measurements; -Find total value of an investment at the end of a defined period; -Calculate the amount to be paid at each installment -Daily movements; -Planning a meal; -Use of public and private services; -Communication using numbers (tel numbers, car number plates)	Numerical methods Verbal interaction on information containing numbers Representation and treatment of information and quantities	-Give an approximate number of seats in a stadium; -Measure the heights at the identification centre; -Take the mass of patients in the hospital; -Determine the amount at stake for a transaction; -estimate number of bags of farm products; -Record results of sporting activities -Find pH of a solution; -Record and store information.	**Matrices** -Determinant of a 2 by 2 matrix -Adjugate (Adjoint) matrix; -Inverse of a 2 by 2 matrix -Multiplicative inverse of 2 by 2 matrices -Solution of linear simultaneous equations using multiplicative inverse of 2 by 2 matrix	-Find the determinant of a 2 by 2 matrix. -Find inverse of a 2 by 2 matrix by definition and by formula; -Find multiplicative inverse of a 2 by 2 matrix, -Solve linear simultaneous equation using matrices -Apply matrices to real life situations;	-Accurate and rapid writing of very large and very small numbers; -Good sense of numbers; -Confident; -Good sense of estimation and approximation -Good sense of orderliness	Documentation Calculator Tape for measuring Material for low scale activity Textbooks Real life situations such as results of mountain race, long jump, triple jump etc pH metre and chart;

MODULE 16
PLANE GEOMETRY. FORM 4

CREDIT: 44 / 4 periods of 50mins a week

GENERAL PRESENTATION

All what was done from points, lines, plane figures, angles, metric system form basic knowledge and skills necessary to continue this module on geometry. This module continues with some aspects of vectors and vector geometry. It goes further to simple transformation, the loci and geometrical construction, trigonometry then circle and circle theorems. It ends with then earth as a sphere. This module is within the families of situations: **Representations and transformation of plane shapes within the environment.** Three categories of actions are involved namely: Perception of the physical environment, production of plane shapes and transformation of the physical environment and determination of measures.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOALS

This module will continue to improve upon learners' understanding and appreciation of pattern, precision and beauty in natural and cultural forms. Learners will also develop the ability to visualize, measure, represent, describe and compare plane figures in the environment, use vector methods to solve problems and associate vectors to people and things in motion, use sine, cosine or tangent in right-angled triangles to determine distances. In addition, learners will develop the sense of order, rigour in working, ability to represent, accuracy and sense of precision and initiation to scientific method in handling life situations. The ability to construct will help learners to be able to represent and interpret the physical environment and also be able to investigate and model situations in the environment. As a result, they will be able to make sensible estimates, verify results, measure accurately, locate positions in real life as well as be alert to the reasonableness of measurements and calculation results.

Critical thinking, creativity and sense of initiative that learners will also develop are attitudes that will contribute to make a citizen autonomous and responsible in carrying out his social roles.

CONTRIBUTION OF MODULE TO LEARNING AREA

Plane geometry is one of the main parts of the Mathematics syllabus due to the expected learning outcome. Measuring in general relates directly to the scientific, technological and economic world of the learner. Accurate measuring and calculations involving lengths, angles and areas, representations and descriptions are an integral part of chemistry, Biology, Physics and other parts of Mathematics. Vectors and trigonometry are used in Physics while transformation, circle are applied in other science subjects. The earth as a sphere shows the application of mathematics to understand nature. Transformation is used by computer and video

game programmers to crate patterns for animations. The learning of plane geometry provides the basic knowledge and skills needed to study 3-dimensional geometry.

CONTRIBUTION OF MODULE TO AREAS OF LIVING
The study of the module enables the learners to:

- Develop the ability to visualize, reason and justify,
- Interpret, understand, classify, appreciate and describe the world through 2-dimensional shapes, their locations, movement and relationships.

By these, they should be able for example to use national flags to demonstrate transformations and symmetry in designs; investigate and recognize the geometrical properties and patterns existing in traditional and modern architecture; use maps in geography as specific forms of grid and also investigate geometric patterns in art.

The areas of living for which knowledge and skills from this module are directly applied are: Family and social life, Economic life, Environment, welfare and health, citizenship, media and communication. The learner each uses or comes across objects from which geometrical shapes can be identified. The outline of figures which are the lines, angles, planes and their intersections are what constitute the physical environment for they are the bases for which real life subjects are constructed.
The study of size, distances, and position of objects in the environment is important since it will provide a language for describing and representing the physical environment and methods for analyzing and drawing conclusions about real life phenomena.
Symmetry contributes in the study of the rules and principles of art and the appreciation of the beauty and taste.

TABLE 16: PLANE GEOMETRY. FORM 4

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent -Modelling -Travelling -Navigation -Demarcation of land boundaries -Gymnastics -Putting a ceiling -Painting -Art or design -Designing a dress -Mapping a town -Building -Surveying -Computer graphics	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Carpeting and putting a ceiling -Produce toys; -Produce maps; -Displacing a log of wood using a crobar -Design a house or a road -Draw the plan for a house -Find height of a building or of a flag pole or of a radio aerial -Find distance	**Vectors in 2-dimension** -Coordinates in 2-dimension; -Collinear and orthogonal vectors, -Position vectors in the x-y plane, -Vectors expressed in terms of unit vectors **i** and **j**, -Dot or scalar product of two vectors; -Angles between two vectors -Vector geometry -Mid point theorem -Proportional division of a vector	-Convert coordinates into components of a vector and vice versa; -Name some vector quantities, -Represent vectors; -Express vectors in terms other vectors; -Find direction of a vector -Calculate displacement vectors in terms of the unit vectors **i** and **j**, -Find scalar products -Find angle between two vectors. -Use midpoint theorem to solve problem on vector geometry -Carry out calculations involving division of a vector in a given ratio.	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	Metre rule Tape measures of different lengths String Geometrical instrument Tracing paper Geoboard and rubber bands Graph boards models A globe A ball

TABLE 16: PLANE GEOMETRY. FORM 4

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent -Modelling -Travelling -Navigation -Demarcation of land boundaries -Putting a ceiling -Art or design -Designing a dress -Mapping a town -Building -Surveying -Photography	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine contents of similar containers -Cut out into similar shapes; -Make model of car, -Identify objects using shape and size -Draw a motive for decoration -Draw the plan for a house -Locate one self in an area -Find height of a building or of a flag pole or of a radio aerial -Find distance -Measure to make furniture -Stretching a string	**Simple Transformation** -Transformation of a point, a line and a plane figure; -Matrix operator; -Enlargement; -Isometrics transformations (translation, reflection, rotation). -Shear and stretch in the x-axis and in the y-axis; -Invariant point, invariant line -Successive transformation, -Transformation in real life	-Relate object and image for a transformation; -Find image of plane figures geometrically; -Find image of plane figures using matrix operator; -Identify and state properties of Isometrics , -Determine the matrix operator for an isometric; -Establish the relationship between area scale factor and determinant of a matrix; -Find the image of a point by a singular matrix and the equation of the straight line containing all these images; -Perform successive transformations,	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	Metre rule Tape measures of different lengths String Geometrical instrument Tracing paper Geoboard and rubber bands Graph boards models A globe A ball

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent -Modelling -Travelling -Navigation -Demarcation of land boundaries -Putting a ceiling -Art or design -Designing a dress -Mapping a town -Building -Surveying -Movement of arm of clock	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine contents of similar containers -Cut out into similar shapes; -Make model of car, -Identify objects using shape and size -Draw a motive for decoration -Draw the plan for a house -Locate one self in an area -Find height of a building or of a flag pole or of a radio aerial -Find distance -Measure to make furniture	**Loci** -Loci in 2-dimensional plane (description and construction) **Geometrical Constructions** -Drawing instruments -Copy lengths and segments -Triangles of given dimensions, -Angle bisector; -Mediator or perpendicular bisector of a line segment, -Special angles (30º and 60º , 90º and 45º); -Division of a line segment into a given number of congruent sides - Circum-circle, in-circle; -Parallel lines - Construct Concentric circles	-Describe some common loci, -Construct simple locus of a point described under a given condition -Construct special angles (30º, 45º, 60º and 90º), -Construct angle bisector ; -Construct mediator of a line segment; -Divide a line segment congruent segments, -Construct Circum-circle, in-circle of a triangle, Line parallel to a given line passing through a given point. -Line perpendicular to a given line and passing through a given point;	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	Metre rule Tape measures of different lengths Geometrical instrument String Tracing paper Geoboard and rubber bands Graph boards models A globe A ball

Contextual framework		Competences		Resource			
Family of situations	**Examples of situations**	**Categories of actions**	**Actions**	**Core knowledge**	**Skills**	**Attitudes**	**Other resources**
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent -Modeling -Travelling -Navigation -Demarcation of land boundaries -Putting a ceiling -Art or design -Designing a dress -Mapping a town -Building -Surveying	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine contents of similar containers -Cut out into similar shapes; -Make model of car, -Identify objects using shape and size -Draw a motive for decoration -Draw the plan for a house -Locate one self in an area -Find height of a building or of a flag pole or of a radio aerial -Find distance -Measure to make furniture	**Trigonometry** -Trigonometric ratios for acute angles -Radian measure -Trig ratios for angles greater than 90° ; -Trigonometric identities -Trigonometric ratios for Secant, cosecant, cotangent; -Graphs of trigonometric functions: $y = \sin x$, $y = \cos x$, $y = \tan x$, $y = a\sin x$, $y = a\cos x$, $y = a\tan x$ where a is a constant and a ≠1,	-Obtain sine and cosine of obtuse angles; -Define radian measure; -Give angles in radian; -Derive trigonometric identity $\sin^2 x + \cos^2 x = 1$; -Draw trigonometric (unit) circle; -Develop some trig identities; -Draw graphs of trigonometric functions; -Determine the trigonometric ratios of angles $0° \le \theta \le 360°$; -Solve simple trigonometric equations of the first order within $0° \le \theta \le 90°$ algebraically and graphically.	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	Metre rule Tape measures of different lengths String Geometrical instrument Tracing paper Geoboard and rubber bands Graph boards models A globe A ball

Contextual framework		Competences		Resource			
Family of situations	**Examples of situations**	**Categories of actions**	**Actions**	**Core knowledge**	**Skills**	**Attitudes**	**Other resources**
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent -Hunting -Modeling -Travelling -Navigation -Demarcation of land boundaries -Putting a ceiling -Art or design -Designing a dress -Mapping a town -Building -Surveying	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine contents of similar containers -Cut out into similar shapes; -Make model of car, -Identify objects using shape and size -Draw a motive for decoration -Draw the plan for a house -Locate one self in an area -Find height of a building or of a flag pole or of a radio aerial -Find distance -Measure to make furniture	-Sine and cosine rule -Angle of elevation, angle of depression in 2 dimensions ; -Height of an in accessible object -Bearings in 2-dimension	-State and use sine and cosine rule in solving triangles; -Solve word problems involving angles of elevation and depression; -Calculate the bearing of one point to another; -Solve problems of bearing in 2-dimensions; -Recognise clockwise and anti-clockwise directions ; -Apply bearings to real life; -Apply the knowledge of trigonometry to real life situations ;	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	Metre rule Tape measures of different lengths Geometrical instrument String Tracing paper Geoboard and rubber bands Graph boards models A globe A ball

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent -Modeling -Travelling -Navigation -Demarcation of land boundaries -Putting a ceiling -Art or design -Designing a dress -Mapping a town -Building -Surveying	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine contents of similar containers -Cut out into similar shapes; -Make model of car, -Identify objects using shape and size -Draw a motive for decoration -Draw the plan for a house -Locate one self in an area -Find height of a building or of a flag pole or of a radio aerial -Find distance -Measure to make furniture	**Circle** -Circle and associated vocabularies: radius, diameter, circumference, arc, chord, tangent, sector, segment, secant, Centre; -Area of circle -Area of sector -Area of segment **Circle theorems** -Angle properties; -Tangent properties; - Cyclic quadrilateral -Intersecting chords theorem; -Concentric circle. -Ring	-Define each of the vocabularies -Identify an arc, a chord or a tangent;, -Establish the different properties in a circle; -Calculate area of sector and that of a segment -Establish and apply tangent properties of a circle; -Find arc length, length of tangent to a circle and length of intersecting chords; -Establish, state and apply the different theorems so as to determine other measures -State properties of a cyclic quadrilateral.	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	Metre rule Tape measures of different lengths Geometrical instrument String Tracing paper Geoboard and rubber bands Graph boards models A globe A ball

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent

-Modeling
-Travelling
-Navigation
-Demarcation of land boundaries

-Putting a ceiling

-Art or design

-Designing a dress

-Mapping a town

-Building

-Surveying | Recognition of plane shapes and transformation within the environment

-Scale drawing

Production of plane shapes

Determination of measures | -Determine contents of similar containers

-Cut out into similar shapes;

-Make model of car,

-Identify objects using shape and size

-Draw a motive for decoration

-Draw the plan for a house

-Locate one self in an area
-Find height of a building or of a flag pole or of a radio aerial

-Find distance
-Measure to make furniture | **The Earth as a sphere,**
-Great circle,
-Equator,
-Meridian,
-parallel of latitude,
- longitude and time,

-GMT and local time
-Position of a place on the surface of the earth
-Angular distance between two points on the earth

-Shortest distance between two points on the earth | -Draw a sphere to represent the earth and indicate the great circle, small circle, equator and meridian
-Locate a place on the surface of the earth in terms of latitude and longitude;
-Tell time using GMT as reference point;
-Find distance between two points on the earth surface;
-Find the shortest distance between two points on the earth surface;
-Calculate time in relation to longitude | -Sense of order

-Precision in calculation

-Critical thinking

-Scientific method

-Ability to visualize

-Ability to reason and justify

-Sense of appreciation | Metre rule

Tape measures of different lengths

Geometrical instrument

String
Tracing paper

Geoboard and rubber bands

Graph boards

models

A glope

A ball |

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent -Modeling -Travelling -Navigation -Demarcation of land boundaries -Town planning -Inter urban roads -Putting a ceiling -Family tree -Art or design -Designing a dress -Mapping a town -Building -Surveying	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine contents of similar containers -Cut out into similar shapes; -Make model of car, -Identify objects using shape and size -Draw a motive for decoration -Draw the plan for a house -Locate one self in an area -Find height of a building or of a flag pole or of a radio aerial -Find distance -Measure to make furniture	**Networks** -Flow Diagrams -Types of flow diagrams -Related vocabularies: Line segment, arc, vertices, endpoints, odd and even vertex, traversable networks, Graphs -Types of graphs (null graphs, complete graphs, directed graphs, mixed graphs, weighted graphs) -Properties of graphs; -Graphs in real life;	-Identify networks -Describe networks -Draw flow diagrams -Recognise network in real life -Find shortest distance	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	Metre rule Tape measures of different lengths Geometrical instrument Strings Tracing paper Geoboard and rubber bands Graph boards models A globe A ball

MODULE N° 17

ALGEBRA AND LOGIC.

CREDIT: **36hours** / 4 teaching hours a week

GENERAL PRESENTATION

Algebra focuses on describing pattern and relationships between variables through the use of symbolic expressions, graphs and tables. This module is the extension of basic algebra and starts here with algebraic processes, equations and inequations then sequences. It is made up of the families of situations: **Describing patterns and relationships between quantities using symbols**. There are three categories of action namely: Interpretation of algebraic models; determination of quantities from algebraic models; representation of quantities and relationships.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOALS

The mastery of this module will help the learner to solve problems using algebraic language and skills and also to examine and study relationships between real life situations. Through the use of symbolic expressions, graphs and tables, learners will be able to recognize, describe and represent patterns and relationship as well as translate real life problems into different forms of equations to solve.

CONTRIBUTION OF MODULE TO LEARNING AREA

Algebra is the language for investigating and communicating most of Mathematics, sciences and technological work. Formulae are highly used in natural sciences (calculating air pressure, resistance, voltage), and in economic growth such as calculating pension for those on retirement etc. Learners will achieve efficient manipulative skills in the use of algebra, and a thorough understanding of these is essential for understanding any field of mathematics and many technical areas where mathematics is applied. This module is a foundation for more advanced mathematics, science and technology in general.

CONTRIBUTION OF MODULE TO AREAS OF LIVING

The areas of living where this module is employed are: Family and Social life, Economic life, Environment, Welfare and health; Citizenship, Media and Communication. Learners develop the competences of translating phrases and sentences in real life into variable expressions and equations to find solutions. They will use algebraic language and skills to describe patterns and relationships in a way that builds awareness of other learning areas as well as issues related to human rights, social economic

life, cultural life, political and environmental issues. In other subject areas, as well as in real life, connections are made between algebraic representations and the problem situations so as to provide better understanding about Mathematical concepts and the different problem situations. Business, industry, engineers and all sorts of workers use algebra to solve many problems. Learners will be able to manipulate graphs in media to represent trends and pattern, represent relationships within an ecosystem, exploit and design geometrical patterns in art and architecture and appreciate symmetrical patterns that occur in nature.

TABLE 17 : ALGEBRA AND LOGIC Form 4

Contextual framework		Competences		Resource			
Family situations	**Examples of situations**	**Categories of actions**	**Actions**	**Core knowledge**	**Skills**	**Attitudes**	**Other resources**
Describing patterns and relationships between quantities using symbols.	-Travelling -Marketing -Construction -Mountains and valleys -Hiring -Currency exchange -Planning a meal -Agriculture -Politics -Loan scheme and leasing	**Interpretation of algebraic models** **Determination of quantities from algebraic models** **Representing quantities and relationships**	-Determine the relationship the area of a rectangular garden and its sides -Find interest on a loan -Find expenses or cost or total cost for an event ; -Find profit on a given sale -Find income for a given business enterprise -Determine the number of article bought from the total cost; -Find change in prices -Express the cost of renting a car in terms of number of hours or days and caution; -Write total amount spent in terms of unit cost and number of articles; -Indicate the distance covered by a car in terms of speed and time. -Justify a result	**Algebraic processes** -Expansion of expressions; -Factorisation of expressions; -Quadratic expressions, -Quadratic identities; -Perfect squares ; -Completing the square; -Solution of quadratic equations by completing the squares; -The quadratic formula; -Quadratic identities -Word problems leading to quadratic equations and their solutions -Polynomials -Factor and remainder theorem.	-Expand and simplify expressions eg $(a + b)(c + d)$; $(a + b)(a - b)$ and $(a \pm b)^2$; -Factorise binomial and trinomials ; - Factorise quadratic expressions ; -Solve quadratic equations by factorization, completing the square and by formula ; -Develop quadratic equations from the roots; -State degree of a polynomial; -Develop identities for the sum and difference of cubes; -State and use remainder and factor theorem;	-Awareness; -Sense of generalisation -Ability to infer -Ability to justify -Logical reasoning -Creativity -Sense of representing	-Documents -Calculator -overhead projector -flash cards -micro computer

TABLE 17 : ALGEBRA AND LOGIC (cont)

Contextual framework		Competences Action		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Describing patterns and relationships between quantities using symbols.	-Travelling -Marketing -Construction -Mountains and valleys -Hiring -Currency exchange -Planning a meal -Agriculture -Politics -Loan scheme and leasing	**Interpretation of algebraic models** **Determination of quantities from algebraic models** **Representing quantities and relationships**	-Determine the relationship the area of a rectangular garden and its sides -Find interest on a loan -Find expenses or cost or total cost for an event ; -Find profit on a given sale -Find income for a given business enterprise -Determine the number of article bought from the total cost; -Find change in prices -Express the cost of renting a car in terms of number of hours or days and caution; -Write total amount spent in terms of unit cost and number of articles; -Indicate the distance covered by a car in terms of speed and time. -Justify a result	**EQUATIONS AND INEQUATIONS** -linear inequalities in one unknown -Solution of an inequality on the real number line -Interval notations (opened, closed interval) -Absolute and conditional inequalities -Inequalities of the form $a \leq mx \pm c$; -Quadratic inequations ; -Graphical representation of linear inequality in two unknown -Graphical solution of linear simultaneous equations and inequalities	-Identify and denote intervals; -Interpret real life problems involving unequal situations using (at least, at most, etc); -Use > or <; -Represent intervals on the number line; -Solve inequality in one unknown and represent solution on the number line -Define and identify absolute inequality; -Solve quadratic inequality; -Solve linear simultaneous equations graphically -Describe and shade region that satisfies a given inequality.	-Awareness; -Sense of generalisation -Ability to infer -Ability to justify -Logical reasoning -Creativity -Sense of representing	-Documents -Calculator -overhead projector -flash cards -micro computer

TABLE 17 : ALGEBRA AND LOGIC (cont)

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Describing patterns and relationships between quantities using symbols.	-Travelling -Marketing -Construction -Mountains and valleys -Hiring -Currency exchange -Planning a meal -Agriculture -Politics -Loan scheme and leasing	**Interpretation of algebraic models** **Determination of quantities from algebraic models** **Representing quantities and relationships**	-Determine the relationship the area of a rectangular garden and its sides -Find interest on a loan -Find expenses or cost or total cost for an event ; -Find profit on a given sale -Find income for a given business enterprise -Determine the number of article bought from the total cost; -Find change in prices -Express the cost of renting a car in terms of number of hours or days and caution; -Write total amount spent in terms of unit cost and number of articles; -Indicate the distance covered by a car in terms of speed and time. -Justify a result	-Nature of roots -Graphs of quadratic functions -Graphical solution of quadratic equations;	-Determine the nature of roots; -Draw graphs of quadratic functions; -Use the graph to solve quadratic equations; -Use quadratic equations to solve word problems; -Solve simultaneous equations (one quadratic) graphically; -Apply the knowledge of quadratic functions to real life situations;	-Awareness; -Sense of generalisation -Ability to infer -Ability to justify -Logical reasoning -Creativity -Sense of representing	-Documents -Calculator -overhead projector -flash cards -micro computer

TABLE 17: ALGEBRA AND LOGIC (cont)

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Describing patterns and relationships between quantities using symbols.	-Travelling -Marketing -Construction -Mountains and valleys -Hiring -Currency exchange -Planning a meal -Agriculture -Politics -Loan scheme and leasing	**Interpretation of algebraic models** **Determination of quantities from algebraic models** **Representing quantities and relationships**	-Determine the relationship between the area of a rectangular garden and its sides -Find expenses or total cost for an event ; -Find profit on a given sale -Find income for a given business enterprise -Determine the number of article bought from the total cost; -Find change in prices -Express the cost of renting a car in terms of number of hours or days and caution; -Write total amount spent in terms of unit cost and number of articles; -Indicate the distance covered by a car in terms of speed and time. -Justify a result -Calculate simple and compound interest	**Sequences** -Simple number patterns; -Sequences -Terms of a sequence, the nth term of a sequence and its notation; Progressions -Arithmetic (sequence) progression (AP), -Arithmetic mean; -Sum of the first n terms of an AP -Geometric progression (GP); -Geometric mean; -Finite series -Sum of the first n terms of a GP; -Application of sequences to real life situations. --Application of sequences to solve real life problems.	-Identify number patterns; -Deduce a general rule for a simple number pattern and sequence, -Find subsequent terms -Recognize an AP and a GP each as a special sequence; -Find a common difference for an AP, and common ratio for a GP, -Find the nth term of an AP and a GP -Find arithmetic mean and geometric mean, -State and apply formula for the sum of the first n terms of an AP and that of a GP.	-Awareness; -Sense of generalisation -Ability to infer -Ability to justify -Logical reasoning -Creativity -Sense of representing	-Documents -Calculator -overhead projector -flash cards -micro computer

FORM 5

MODULE 18
PLANE GEOMETRY. FORM 5

CREDITS: 44hours of 4 hours a week

GENERAL PRESENTATION

This module deals with polygons, quadrilaterals and symmetry. This module is within the families of situations: **Representations and transformation of plane shapes within the environment.** Three categories of actions are involved namely: Perception of the physical environment, production of plane shapes and transformation of the physical environment and determination of measures.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOALS

This module will help learners be familiar with geometrical structures, relationships and representations of plane shapes. Learners will develop the ability to measure, represent, describe and compare plane shapes in the environment. They will be able to appreciate and identify symmetry and symmetrical figures in the environment. The ability to construct these figures will help learners to be able to represent and interpret the physical environment and also be able to investigate and model situations in the environment. Critical thinking, creativity and sense of initiative that learners will also develop are attitudes that will contribute to make a citizen autonomous and responsible in carrying out his social roles.

CONTRIBUTION OF MODULE TO LEARNING AREA

Plane geometry is one of the main parts of the Mathematics syllabus due to the expected learning outcome. Measuring in general relates directly to the scientific, technological and economic world of the learner. Accurate measuring and calculations involving lengths, angles and areas, representations and descriptions are an integral part of chemistry, Biology, Physics and other parts of Mathematics. Symmetry is found and applied in Chemistry, Biology and in computer sciences.

CONTRIBUTION OF MODULE TO AREAS OF LIVING

The areas of living for which knowledge and skills from this module are directly applied are: Family and social life, Economic life, Environment, welfare and health, citizenship, media and communication. The learner each uses or comes across objects from which geometrical shapes can be identified. The outline of figures which are the lines, angles, planes and their intersections are what constitute the physical environment for they are the bases for which real life subjects are constructed.

The study of size, distances, and position of objects in the environment is important since it will provide a language for describing and representing the physical environment and methods for analyzing and drawing conclusions about real life phenomena.

Symmetry contributes in the study of the rules and principles of art and the appreciation of the beauty and taste.

TABLE 18:   PLANE GEOMETRY   Form 5

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Representations and transformation of plane shapes within the environment	-The map of a town, country or continent -Model of a building -Travelling -Demarcation of land boundaries -Putting a ceiling -Art or design -Designing a dress -Mapping a town -Building -Surveying -Location	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine measure of similar containers -Cut out into similar shapes; -Make model of car, -Identify objects using shape and size -Draw a motive for decoration -Draw the plan for a house -Locate one self in an area -Find height of a building or of a flag pole or of a radio aerial -Find distance	**Coordinate geometry** -Point dividing a line segment ; -Internal division of a line segment ; -External division of line segment ; -Distance between two points ; -Equation of a straight line -Parallel and perpendicular lines ; -Graphical solutions of linear simultaneous equations in two unknowns ; -Graphs of quadratic functions ; -Gradient of a tangent to a curve at a given point on the curve -Particular points on a curve.	-Divide a line segment internally or externally in a given ratio; -Find distance between two points; -Find the equation of a straight line with given conditions; -Justify that two lines are perpendicular or parallel ; -Solve simultaneous equations graphically ; -Make a table of values for a quadratic function and draw the graph; -Find gradient of a tangent to a curve at a point ; -Find the coordinates of particular points (max, min, point of intersection with the axes).	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	-Metre rule -Tape measures of different lengths -Geometrical instrument -Set square Cartesian plane, graph papers, square boards, geoboards, straight edge, topographical maps, real life situations

TABLE 18: PLANE GEOMETRY (CONT)

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent -Draw model of a building -Travelling -Demarcation of land boundaries -Putting a ceiling -Art or design -Designing a dress -Mapping a town -Building -Surveying	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine measure of similar containers -Cut out into similar shapes; -Make model of car, -Identify objects using shape and size -Draw a motive for decoration -Draw the plan for a house -Locate one self in an area -Find height of a building or of a flag pole or of a radio aerial -Find distance	**Euclidean Geometry** -Geometrical figures; -Polygons; -Convex polygons; -Angle properties of polygons; Symmetry -Orthogonal (Line) symmetry; -Rotational or point symmetry -Properties of triangles, quadrilaterals and circles directly related to their symmetries	-Identify different geometrical figures (triangles, circles etc) using their properties, state relationship between some; -State and use angle properties of polygons and apply it to real life situations ; -Find formula for finding the sum of interior angles of a polygon. -Differentiate types of symmetry; - Recognise axes of symmetry; -Find line(s) of symmetry or point of symmetry for some plane figures	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	-Metre rule -Tape measures of different lengths -Geometrical instrument -Set square Cartesian plane, graph papers, square boards, geoboards, straight edge, topographical maps, real life situations polygonal shapes

TABLE 18: PLANE GEOMETRY (CONT)

Contextual framework		Competences		Resource			
Family of situations	**Examples of situations**	**Categories of actions**	**Actions**	**Core knowledge**	**Skills**	**Attitudes**	**Other resources**
Representations and transformation of plane shapes within the environment	-Drawing the map of a town, country or continent -Draw model of a building -Travelling -Demarcation of land boundaries -Putting a ceiling -Art or design -Designing a dress -Mapping a town -Building -Surveying	Recognition of plane shapes and transformation within the environment -Scale drawing Production of plane shapes Determination of measures	-Determine measure of similar containers -Cut out into similar shapes; -Make model of car, -Identify objects using shape and size -Draw a motive for decoration -Draw the plan for a house -Locate one self in an area -Find height of a building or of a flag pole or of a radio aerial -Find distance	**Euclidean Geometry** Quadrilaterals -Different quadrilaterals; -Areas of quadrilaterals	-State different types of quadrilaterals; -State the properties of any quadrilateral; -Identify quadrilaterals that are not parallelograms (trapezium and kite) and justify; -Find the area of any given quadrilateral.	-Sense of order -Precision in calculation -Critical thinking -Scientific method -Ability to visualize -Ability to reason and justify -Sense of appreciation	-Metre rule -Tape measures of different lengths -Geometrical instrument -Set square Cartesian plane, graph papers, square boards, geoboards, straight edge, topographical maps, real life situations polygonal shapes

MODULE N° 19

STATISTICS AND PROBABILITY.

CREDIT: **40 hours** / 4 teaching hours a week

GENERAL PRESENTATION

This module deals with representation of data from real life situations in different forms (frequency table, pictogram, bar chart, pie chart) and possible interpretations. With the study of data handling, the learners will develop the skills to collect, organize, display, analyse and interpret information. This model is within the family of situations '**Organization of information and estimation of quantities'** and has as categories of actions: Collection, organization and exploitation of information; Interpretation of results.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOALS

This module will help learners collect, process and interpret data and understand, estimate and use probabilities. It will also develop in learners the sense of organization, precision and good judgment. Learners will be able to access information in a single database. Use appropriate language to justify decisions. These attitudes will help the learner to be able to take up duties as a member of the family, make informed decisions, and develop autonomy in the production and consumption of goods and services. They will make sense of data after collecting, organizing and interpreting, drawing conclusions and making predictions. They will use mathematics effectively and critically showing responsibility towards the environments and health of others.

CONTRIBUTION OF MODULE TO LEARNING AREA.

Great deal of research work in science and technology (health and technological products etc) and other learning areas such as Economics and Geography are represented in statistical form.

CONTRIBUTION OF MODULE TO AREA OF LIVING

Information in statements, graphs, tables and charts are presented to us daily through television, radio, news papers or any other form of media and communication. This information could be on crime rates, rainfall, sport results, election polls, government spending, rate of infant mortality, population or economic growth. The interpretation of this data after analyzing will lead learner to meaningful participation in political, social and economic activities. The learners will develop a sense of how mathematics can be used to: manipulate data to represent or misrepresent trends and pattern, provide solutions that can sustain or destroy the environment, promote or harm the health of others, understand distribution of resources etc. Through the study of chance on the other hand, the learner will develop skills and techniques for making informed choices and coping with randomness and

uncertainty. Applications of competences within this module are found in the areas of living: Family and social life, Economic life, citizenship, media and communication. Within these areas, collection, organization, displaying and interpretation of simple data by the learners are essential skills that will help them to assume their positions as responsible members of a family, make good choices on what to consume (information, goods, services), participate meaningfully in basic economic activities, be able to show high level of responsibility towards the environment, be able to provide solutions that can improve the environment and will be able to judge economic trends and patterns.

TABLE 19: STATISTICS AND PROBABILITY

Contextual framework		Competences Action		Resource			
Family of situations	**Examples of situations**	**Categories of actions**	**Actions**	**Core knowledge**	**Skills**	**Attitudes**	**Other resources**
Organization of information and estimation of quantities in the consumption of goods and services	-Census of a population by sex, age group, profession, religion etc. -Demographic growth -Classification of football teams -Opinion polls on a new product or new policy -Evolution of the budget of a country due to economic growth	**organization, presentation and exploitation of information** **Interpretation of results** **Taking chances**	-Record yearly rainfall -Record production of crude oil by some countries -Compile results (exams, elections etc) -Result of football matches -Display a month's sales by a shop -Compare production or events -Forecast weather or election result -Record number of accidents by motor bike -Choose a career, -Analyse data collected for a project.	**Statistics** -Data collection and representation for grouped and ungrouped data; -Histogram, frequency polygon; -Measures of central tendency (position) for grouped and ungrouped data ; -Cumulative frequency table (increasing and decreasing) ; -Cumulative frequency curve (Ogive) ; -Measures of dispersion (spread) : range, inter-quartile range, semi inter quartile range, mean deviation, variance, Standard Deviation	-Draw histogram with equal and unequal class width; -Draw frequency polygon and deduce symmetry and asymmetry; -Find mean, mode, median, percentiles for grouped and ungrouped data ; -Find the mean deviation from the mean ; -Find Variance and Standard Deviation -Draw, Ogive for grouped and ungrouped data and estimate inter-quartile range from it.	-Sense of organization; -Precision -Sense of good judgment -Critical thinking -Vigilant -Patient -Politeness	-Calculator -Graph board -Data from environment -Charts illustrating various data -News paper -Computer -National department of statistics -Students Data from the environment, charts illustrating various presentations of data.

TABLE 19: STATISTICS AND PROBABILITY (cont)

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Organization of information and estimation of quantities in the consumption of goods and services	-Census of a population by sex, age group, profession, religion -Demographic growth -Classification of football teams -Opinion polls on a new product or new policy -Evolution of the budget of a country due to economic growth	**organization, presentation and exploitation of information** **Interpretation of results** **Taking chances**	-Record yearly rainfall -Record production of crude oil by some countries -Compile results (exams, elections etc) -Result of football matches -Display a month's sales by a shop -Compare production or events -Forecast weather or election result -Record number of accidents by motor bike -Choose a career,	**Probability** -Description and revision of vocabularies -Probability scale $(0 \le P(A) \le 1)$; -Probability space ; -Probability of an event ; -Complementary events; -Compound events; -Mutually exclusive events ; -Independent events ; -Conditional probability -Laws of probability ; -Tree diagrams -Probability in real life situations	-Determine probability from experiments and real life situations ; -Construct the probability space or sample space; -Identify complementary events ; -apply $P(A) + P(A') = 1$; -State and apply laws of probability ; -Differentiate between mutually exclusive and independent events and calculate their probabilities; -Use a tree diagram to calculate probability of successive events.	-Sense of organization; -Precision -Sense of good judgment -Critical thinking -Vigilant -Patient -Politeness	-Calculator -Graph board -Data from environment -Charts illustrating various data -News paper -Computer -National department of statistics -Students Data from the environment, charts illustrating various presentations of data.

MODULE N° 20
SOLID FIGURES.
CREDIT: **20 hours** ∕ 4 teaching hours a week

GENERAL PRESENTATION

This module deals with description, recognition, identification and representation of the sphere, cone, pyramid and the prism. This module is within the family of situations: **Usage of technical objects in everyday life**. The categories of actions identified for this module are: Recognition of objects; production of objects; determination of measures. In school, at home and in the market place or on a journey, students encounter different shapes, as such the description and representation of these shapes throughout the module are expected to be treated in context.

CONTRIBUTION OF MODULE TO OUTCOME AND CURRICULUM GOAL

The study of geometry and 3-dimensional geometry in particular helps in the construction of reasoning, description and calculation techniques. As with plane geometry, the study of solids will enable the learner to develop the ability to visualize, interpret, calculate relevant values, reason and justify, classify, appreciate and describe the world through 3-dimensional objects. It will focus on the properties, relationships, orientations, positions and transformations of 3-dimensionsl objects. They will also develop the spirit of initiative, creativity and enterprise, the development of arts such as painting and drawing as well as the development of aesthetic values. All these competences contribute in becoming autonomous and independent in carrying out different activities in the environment which is full of manmade and natural objects.

CONTRIBUTION OF MODULE TO LEARNING AREA

Measuring in general is used greatly in the sciences, the technological and economic world of the learner. Accurate measuring and calculations involving volume or quantity in general, are part of real life. The competences developed by learners here are fundamental to the mastery of other science subjects such as Biology, Physics, Chemistry and other parts of Mathematics.

CONTRIBUTION OF MODULE TO AREAS OF LIVING

As was mentioned earlier with plane geometry, the study of this module enables the learners to:

- Develop the ability to visualize, reason and justify,

- Interpret, understand, classify, appreciate and describe the world through 3-dimensional shapes, their locations, movement and relationships.

By so doing, they should be able for example to use national flags to demonstrate transformations and symmetry in designs; investigate and recognize the geometrical properties and patterns existing in traditional and modern architecture; use maps in geography as specific forms of grid and also investigate geometric patterns in art.

The different areas of living for which we see direct application of the competences from this module are: Family and social life, Economic life, Environment, welfare and health as well as Media and communication. The study of this module also provides a language for describing the physical world and gives the methods for analyzing and drawing conclusions about real world phenomena which subsequently go to improve understanding of the patterns, precision, achievement and beauty in natural and cultural forms.

TABLE 20: SOLID FIGURES.

Contextual framework		Competences		Resource			
Family of situations	Examples of situations	Categories of actions	Actions	Core knowledge	Skills	Attitudes	Other resources
Usage of technical objects in every day life.	-Works of arts -Form for moulding -Baking dishes -Digging a well -Movable TV stand	**Recognition of objects** **Productions of objects** **Linking volume to capacity** **Determination of measure and how much an object can contain**	-Describe solids in the environment -Identify objects described by somebody - -Produce cartoons for packaging or baking tins -Compare capacity or volume of two containers - -Determine the volume of water a tank can contain	**Solids** Cone, cuboids, cylinders, prisms, pyramid, tetrahedron, sphere; 3-dimensional problems -Scale drawing -Calculations involving 3-dimension problems -Volume of pyramid and tetrahedron; -Angle between two lines; -Angle between a line and a plane	-Find length, surface areas and volumes of similar solid figures using the scale factors ; -Find total surface area and volume of solids ; -Recognize a tetrahedron as a pyramid; -Draw solids (cone, cube, cylinder, pyramid, tetrahedron etc) of given dimensions to a given scale ; -Calculate angle between two lines ; -Calculate angle between a line and a plane.	-Sense of organization -Sense of initiative -Precision in calculation -Ability to visualize -Sense of appreciation -Creativity -Spirit of enterprise	-Calculator -measuring instrument -concrete objects -Models of the different shapes -Cardboard -Containers -Geometrical instrument -Manila papers,

Article 2: The syllabus presented in article one here above shall be implemented as from the beginning of the 2016-2017 school year;

Article 3: All previous provisions repugnant hereto are hereby repealed;

Article 4: Inspectors Coordinator General, the Director of General Secondary Education, the Director of Examinations and Certification, Regional Delegates of Secondary Education, Divisional Delegates of Secondary Education, Education Secretaries of various Private Educations Agencies, Principals of public and private schools, each in their own sphere shall be charged with the strict implementation of this order which shall be inserted and published in the Official Gazette in English and French.

Yaoundé, - 9 DEC 2014

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Louis Bapes Bapes