



The Republic of Uganda

Ministry of Education and Sports

MATHEMATICS TEACHING SYLLABUS

Uganda Certificate of Education

Senior 1 - 4

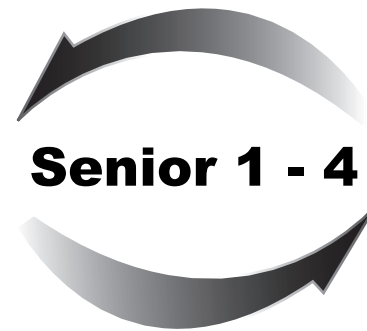


National Curriculum Development Centre
P.O. Box 7002
Kampala - Uganda

2008

MATHEMATICS TEACHING SYLLABUS

UGANDA CERTIFICATE OF EDUCATION



National Curriculum Development Centre

Mathematics Teaching Syllabus, National Curriculum Development Centre.

NATIONAL CURRICULUM DEVELOPMENT CENTRE (NCDC) UGANDA - 2008.

Copyright © NCDC. 2008

P.O. BOX 7002, KYAMBOGO, KAMPALA.
KAMPALA - UGANDA

URL www.ncdc.go.ug

All rights reserved. No part of this syllabus should be reproduced, stored in a retrieval system or transmitted in any form by any means, electronic, mechanical, photocopying, recording or otherwise without the permission of the authors and publisher. No patent liability is assumed with respect to the use of the information contained herein.

ISBN 978-9970-117-24-8 (Paperback edition)

Published by:

National Curriculum Development Centre.

Design by Soft Prints and Designs Ltd.

Mathematics Teaching Syllabus, National Curriculum Development Centre.

Table of Contents

	Page
<i>Acknowledgement</i>	<i>iv</i>
<i>Foreward</i>	<i>v</i>
 SECTION I	
Introduction	vi
Purpose	vi
Broad Aims of Education	vi
Aims and Objectives of Secondary Education.....	vii
Aims of teaching Mathematics.....	vii
Target.....	viii
Scope and Depth	viii
Teaching Sequence.....	viii-ix
Time Allocation	ix
How to use the Teaching Syllabus	x
Mode of Assessment	x
 SECTION II	
Senior One	1
Senior Two	18
Senior Three	36
Senior Four	54
<i>References</i>	<i>65</i>

ACKNOWLEDGEMENT

The National Curriculum Development Centre (NCDC) would like to express its appreciation to all those who worked tirelessly towards the production of this 'O' level (UCE) Curriculum Teaching syllabi.

Gratitude goes to the Ministry of Education and Sport for supporting the writing of the different subject syllabi. Our thanks also go to partners in education who provided the professional information and advice that was put together to come up with this teaching syllabus. These include Secondary Schools, Universities, National Teacher Colleges, Uganda National Examinations Board (UNEB), Directorate of Education Standards (DES), Technical and Business Institutions, Private Organisations and Religious Organisations.

Last but not least we would like to acknowledge all those behind the scenes who formed part of the team that worked hard to finalise the work on the various syllabi.

The National Curriculum Development Centre (NCDC) takes responsibility for any shortcomings that might be identified in the publication and welcomes suggestions for effectively addressing the inadequacies.



Connie Kateeba
DIRECTOR,
National Curriculum Development Centre

FOREWORD



The educational experiences one goes through have a lot of bearing on the knowledge and skills acquired, attitudes developed and consequently what one is able to do in achieving quality and successful life.

The teaching syllabuses for O-Level subjects will go a long way in achieving the government aims and objectives of education for all. For a long time each school has been developing its own teaching syllabuses. However, there has been need to standardise the various teaching syllabuses, in terms of scope and depth of the content in the various subjects for every school. This will provide detailed guidance to the teacher for scheming and lesson preparations. The syllabuses still leave room for the teacher to use his/her own creativity. These standardised syllabuses will guide the teaching/learning process.

I appeal to all stakeholders to join hands and make the implementation of this educational process a success.

Dr. John Mbabazi
Director of Education
Ministry of Education and Sports

SECTION I

INTRODUCTION

This teaching syllabus was developed as a result of merging two Mathematics syllabus, that is “alternative S and Alternative B”. The two alternatives were used in Uganda Secondary Schools after Uganda had established its own examination Board.

PURPOSE

The importance and use of Mathematics in daily life need not to be over emphasised. The teachers, the major target of using the syllabus, have the challenge of bringing out or using examples of where Mathematics is used in the daily life of the learners. Teachers should not make the subject abstract instead the environment should be used while teaching.

BROAD AIMS OF EDUCATION

- (i) To promote understanding and appreciation of the value of national unity, patriotism and cultural heritage, with due consideration of internal relations and beneficial inter-dependence;
- (ii) To inculcate moral, ethical and spiritual values in the individual and to develop self-discipline, integrity, tolerance and human fellowship;
- (iii) To inculcate a sense of service, duty and leadership for participation in civic, social and national affairs through group activities in educational institutions and the community;
- (iv) To promote scientific, technical and cultural knowledge, skills and attitudes needed to promote development;
- (v) To eradicate illiteracy and to equip the individual with basic skills and knowledge to exploit the environment for self-development as well as national development, for better health, nutrition and family life, and the capability for continued learning; and
- (vi) To contribute to the building of an integrated, self-sustaining and independent national economy.

THE AIMS AND OBJECTIVES OF SECONDARY EDUCATION

- (i) Instilling and promoting national unity and an understanding of social and civic responsibilities; strong love and care for others and respect for public property, as well as an appreciation of international relations and beneficial international co-operation.
- (ii) Promoting an appreciation and understanding of the cultural heritage of Uganda including its languages;
- (iii) Imparting and promoting a sense of self-discipline, ethical and spiritual values and personal and collective responsibility and initiative;
- (iv) Enabling individuals to acquire and develop knowledge and an understanding of emerging needs of society and the economy;
- (v) Providing up-to-date and comprehensive knowledge in theoretical and practical aspects of innovative production, modern management methods in the field of commerce and industry their application in the content of socio-economic development of Uganda;
- (vi) Enabling individuals to develop basic scientific, technological, technical, agricultural and commercial skills required for self-employment;
- (vii) Enabling individuals to develop personal skills of problem-solving, information gathering and interpretation, independent reading and writing, self-improvement through learning and develop of social, physical and leadership skills such as are obtained through games, sports, societies and clubs;
- (viii) Laying the foundation for further education;
- (ix) Enabling the individual to apply acquired skills in solving problems of the community, and to develop in him a strong sense of constructive and beneficial belonging to that community;
- (x) Instilling positive attitudes towards productive work and strong respect for the dignity of labour and those who engage in productive labour activities.

AIMS OF TEACHING MATHEMATICS

The aims of teaching Mathematics include among others:

- a) To develop an attitude of logical thought.

- b) To enable the learner interpret and analyse everyday Mathematics related problems.
- c) To present information in tabular and graphic form.
- d) To prepare the learner for further training in Mathematical techniques.
- e) To provide an understanding of basic Mathematical concepts.

The integration of subjects like Agriculture, surveying, Engineering, Physical Education, Graphic Art, Business Studies with Mathematics must be revealed to the learners. This also is the responsibility of the teacher. Similarly approximation and estimation should be part and parcel of the Mathematics lesson wherever applicable. In addition, it is strongly recommended that the routine use of mental work should be a priority in every Mathematics classroom. It should be noted that well drawn diagrams explain many Mathematical concepts better than words and the learner should be given a chance to draw diagrams as well as to interpret them. This is one way of ensuring that learners not only learn Mathematics but also do Mathematics.

TARGET

This syllabus is supposed to be used by grade V or graduate teachers of Mathematics.

SCOPE AND DEPTH

This teaching syllabus groups the various topics in such a way that the inherent structure within the subject is not lost to the learner. For convenience of use the syllabus is divided into four parts, one for each level of secondary school, i.e. S.1 to S.4.

S.1 has 21 topics, S.2 has 17 topics, S.3 has 16 topics and S.4 has 10 topics. The teaching syllabus also includes considerable detail about the various topics. It gives insight into the depth to which each topic should be taken and provides a basis for writing teaching materials.

TEACHING SEQUENCE

The teaching sequence is as follows from senior one through to senior four:

Senior One

Sets

Number Bases

Numerical Concepts II

Fractions and Percentages

Rectangular Cartesian Coordinates in 2 Dimensions

Locus

TEACHING SEQUENCE cont'd

Graph Plotting and Drawing
Algebraic Symbols
Geometric Construction Skills Training
Sequence and Number Patterns
Approximation and Estimation
Commercial and Household Arithmetic
Bearing
General and Angle Properties of Geometric Figures
Distance/ Time/Speed/Time Graph 1
Statistics 1
Algebra
Equations of Lines and Curves
Senior Two
Algebra : Use of Symbols, Substitution
Mappings and Relations
Numerical Concepts
Business Arithmetic
Vectors and Translation 1
Graphs II
Statistics
Indices and Logarithms
Inequalities and Regions
Algebra
Ration and Proportion
Similarities and Enlargement
The Circle
Rotation
Geometry Length and Area Properties
Geometry Nets and Solids
Numerical Concepts
Senior Three

Set Theory
The Equation of A Straight Line
Sine, Cosine and Tangent
Data Collection
Vectors
Proportion
Business Mathematics
Matrices
Probability
Algebraic Expressions, Equations and Inequalities
Quadratic Equations
Circles
Bearings
Areas and Volumes of Solids
Further Transformations
Simultaneous Equations
Senior Four
Matrices of Transformation
Composite Functions
Equations and Inequalities
Linear Programming
Algebra
Rate of Change
Area under a Graph
Extension of Trigonometry
Loci

TIME ALLOCATION

The time allocated to Mathematics is 6 periods of 40 minutes each per week.

HOW TO USE THE SYLLABUS

The teacher should think of various ways to enable the learners to experience Mathematics. Examples of the uses of each topic in this teaching syllabus can be brought out during the teaching /learning process. Some have been given in the syllabus while others will be thought of by each teacher as they arise.

Practical problem solving should be an everyday part of the Mathematics curriculum. Problems should be so chosen as to link the concepts and skills acquired in the Mathematics lessons with their applications in problem – situations that arise in the environment of the students. This not only gives the learner a chance to consolidate the new concepts and techniques that have been learned but also allows him or her to appreciate the power of the subjects as a tool to understand, interpret and control the environment.

Learners should be encouraged as much as possible, to work together in solving problems and conducting Mathematical investigations to become familiar with the processes in Mathematics. This will help to eradicate anxiety and promote co-operation within the class as a whole.

MODE OF ASSESSMENT

Learners should be assessed in Mathematics using continuous assessment. This can be in the form of daily exercises, assignments, projects, home works, practicals and many other methods. With continuous assessment, time will not be lost as the practise now in many schools where there is a schedule for doing examinations/tests, for example, beginning of term, mid term and end of term examinations.

Continuous assessment marks should be reflected on learners report from S.1 term I upto S.4 term I. It is important that the teacher keeps the assessment records of each learner so as to monitor the learner's progress.

Summative assessment will be done at the end of S.4 by Uganda National Examination Board. The examination will be composed of two examinations paper each with two sections. Each paper will be 2 ½ hours.

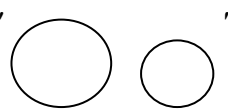
SECTION II

SENIOR ONE TERM ONE

TOPIC 1. SETS

- Specific Objectives:**
- (i) Define a set
 - (ii) Write different symbols associated with sets correctly.
 - (iii) Identify different types of sets
 - (iv) Represent sets in venn – diagrams
 - (v) Use knowledge of sets to solve real life problems

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
1.	Set Theory	a) Identification of all members belonging to a described set. b) Description/naming of a listed set accurately. c) Listing all members of a described set. Use of symbols e.g' $\{ \}$ $\in$, $\emptyset$, $\cup$, $\cap$ as needed.	4	SMU Bk 1 Ch. 1 SMEA Bk 1 Ch. 2 SMEA Bk. 3 SMUSS Bk. 3 Ch. 1	In all examples and problems try to use familiar situations. Make clear the distinction between 'sets' as used in daily – life and the term in Mathematics. Use familiar sets – allow learners to introduce sets of their own making. Guide them towards accuracy in description. Emphasise the use of curly brakets. Let learners discuss sets.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
		d) Types of sets Disjoint sets, equal sets, empty sets, intersecting sets, sub -sets, universal sets.	4	SSM. Bk 1 Ch. 1	Chalk circles on the floor, Teaching boards,use learners and natural sets within them. Only diagrams to show the expected shape of say disjoint sets other than numbers in sets. This activity should be done in groups.  Restrict to 2 sets at a time.
		e) Operations on sets Venn diagrams show the union of two sets, and listing members and finding numbers of elements in the union of two sets –e.g. n(A) for the number of elements in set A. Listing of subsets and use of symbols $\subset$ and $\not\subset$	4 2	" SMEA Bk. 1 Ch. 2	The rule for the number in the union of two intersecting sets should be discovered by learners using concrete examples. NB. The use of n(A) needs careful clarification – it is often misunderstood.

TOPIC 2: NUMBER BASES**Specific objectives:**

- (i) Identify numbers in any base using abacus.
- (ii) Convert numbers from one base to another.
- (iii) Manipulate numbers in different bases with respect to all four operations.
- (iv) Identify place values of different bases

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
2	Number Bases	a) Representation of numbers in various bases e.g 10, 5, 6, 12, and 2.	4	SMEA Bk 1 Ch. 1	Brief revision of primary level work
		b) Operations using bases (addition, subtraction, multiplication and division).	6	SSM Bk 1 Ch.3	Use of Abacus

TOPIC 3: NUMERICAL CONCEPTS I**Specific objectives:**

- (i) Tell the difference between natural numbers and whole numbers
- (ii) Identify, read and write natural numbers as numerals and words.
- (iii) Use directed numbers in real life situations
- (iv) Identify directed numbers
- (v) List down the rules of integers
- (vi) Use BODMAS rule to carry out the four Mathematical operations on integers.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
3.	Numerical Concepts I	a) Sets of numbers b) Identification of natural numbers and their use c) Identification of whole numbers and their use d) Identification of integers and their operations	2 2 2 6	GMSS Bk. 1 SMEA Bk 1, Ch. 3 SSM Bk 1 MKS Bk 1, Ch. 1	Use the idea of sets for studying various types of numbers. Classification of numbers should be considered using the number line. Emphasize writing figures in words. Students should discuss the numerical concepts

TOPIC: 4 NUMERICAL CONCEPTS II**Specific Objectives:**

- (i) Identify even, odd, prime and composite numbers
- (ii) Relate common factors with H.C.F and multiples with L.C.M
- (iii) Work out divisibility tests of some numbers.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
4.	Numerical Concept II	a) Odd and even, prime and composite numbers. b) Factors and multiples c) Tests of divisibility	4 4 4	SMU Bk 1 Ch. 2 SMEA Bk 1Ch. 7 Ch. 3, Ch. 7	Learners should be able to distinguish between prime and composite numbers. Emphasize on H.C.F. & L.C.M

TOPIC: 5 FRACTIONS AND PERCENTAGES

- Specific Objectives:**
- (i) Describe different types of fractions.
 - (ii) Convert improper fractions to mixed numbers and vice versa.
 - (iii) Work out problems from real life situations
 - (iv) Covert fraction to decimals and vice versa
 - (v) Identify and classify decimals into terminating, non terminating and recurring decimals
 - (vi) Convert fractions and decimals into percentages and vice versa.
 - (vii) Calculate the given percentage in a given quantity
 - (viii) Work out real life problems in percentage

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
5.	Fractions and percentages	a) Basic concepts of Fractions - Meaning of fractions, types of fractions - Conversion of fractions from one form to another b) Operations on fractions c) Decimals - Place value system - Fractions to decimals and vice versa - Terminating and non-terminating decimals - Reccuring decimals and fractions d) Percentages - Conversion of a fraction to a percentage and vice versa - Percentage decrease and increase.	14	SMEA Bk. 1 Ch. 5 MKS Bk. 1 Ch. 7 Sch. Maths (Parr. 1) SSM Bk. 1 SMUSS Bk. 2 Ch. 4 GMSS Bk 1	- Help the learners to identify different types of fractions. - Emphasis should be put on comparison of fractions and on place values e.g. $10.047 + 2.1$ - Introduce BODMAS - Demonstrate for the students

TERM II

TOPIC: 6 RECTANGULAR CARTESIAN COORDINATE S IN 2 DIMENSIONS:

Specific Objectives:

- (i) Identify the y – and x -axis
- (ii) Draw and label the complete Cartesian plane
- (iii) Read and plot points on the Cartesian plane.
- (iv) Choose and use appropriate scale for a given data.
- (v) Identify places in a map using coordinates (apply coordinates in real life situations)

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
6.	Rectangular Cartesian Co-ordinates in 2 dimensions	Plotting points, drawing axes, using for example,scales and giving co-ordinates of specific points. Application of coordinates in location of places on a map	8 2	SMU Bk 1 Ch. 9, MKS, Bk. 1, Ch. 19 SMEA Bk 1,Ch. 4, GMSS 1 Ch. 14	Emphasize on the use of graph books

TOPIC: 7 LOCUS**Specific Objectives:**

- (i) Define locus
- (ii) Identify a straight line and a circle as loci.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
7.	Locus as a set of points satisfying a given condition.	Simple plotting exercise where the result is e.g. a circle, or a straight line.	4	SMU Bk 2 Ch. 14 MKS Bk. 1	The word “locus” need not be mentioned until later. Simple work and definitions are required. The simple work should be done practically.

TOPIC: 8 GRAPH PLOTTING AND DRAWING**Specific Objectives:**

- (i) Plot and draw lines through given points
- (ii) Make a table of values for a given linear relation
- (iii) Choose and use appropriate scales.
- (iv) Draw, read and interpret the graph.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
8.	Graph plotting and drawing	Straight lines Parallel and intersecting lines Intercepts	4 2	MKS Bk. 1 Ch. 4 GMSS Bk. 1	Plenty of examples to plot and draw. Emphasise idea of intercepts

TOPIC 9: ALGEBRAIC SYMBOLS**Specific Objectives:**

- (i) Use letters to represent numbers.
- (ii) Write statements in algebraic form
- (iii) Evaluate algebraic expressions by substituting numerical values.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
9.	Algebraic symbols.	(a) Symbols in general (b) Algebraic symbols (c) Statements (general and then Mathematical) (d) Interpretation of symbolic statements.	2 2 2 2	SMU Bk 1 SMUSS Bk 2 Ch. 1 GMSS Bk. 1 MKS Bk. 1 Ch. 10	Ask learners why we use symbols. Ask learners to identify common operation symbols and their meaning e.g. = , x, +, and then introduce a more uncommon symbols e.g. $\neq$. NB: Emphasize that symbols are a kind of “shorthand”

TOPIC 10: GEOMETRIC CONSTRUCTION SKILLS TRAINING

Specific Objective: (i) Use a ruler and compass only to construct perpendicular lines, special angles, parallel lines and polygons.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
10.	Geometric construction – skills training	a) Drawing of e.g.circles, triangles, angle bisector, mediators, perpendiculars . b) Accurate measurement of length and angles. c) Knowledge of the terms: acute, obtuse, reflex. d) Construction of special angles e.g. 60° and 45° without a protractor. e) Nets of boxes.	4 2 4 2	SMU Bk 1 Ch. 7 MKS Bk. 1 Ch. 21 SMEA Bk 1 Ch. 6	Demonstrate the use of a set and then emphasize use of a mathematical set.

TOPIC 11: THE CIRCLE

Specific Objectives:

- (i) Define and identify various parts of the circle.
- (ii) State and use the formulas for circumference and area of the circle.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
11.	The Circle	Knowledge of the terms: arc, chord, circumference radius, diameter and area formulae	2	SMU Bk 1 Ch. 7 SMU Bk 2 Ch. 10	Revise practically the learner draws the parts.

TOPIC 12: SEQUENCE AND NUMBER PATTERNS**Specific Objectives:**

- (i) Draw and identify the patterns for a given set of numbers.
- (ii) Describe a general rule when a pattern is given.
- (iii) Define a sequence
- (iv) Determine a term in a sequence
- (v) Find the missing numbers in a given sequence

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
12.	Sequences and number patterns	Triangle, square, and rectangle numbers. Simple sequences.	4	SMEA Bk 1 Ch. 7	Ask learners to identify different number patterns. Assign the learner the duty of finding different patterns.

TOPIC13: APPROXIMATION AND ESTIMATION**Specific Objectives:**

- (i) Give rough answers to calculations.
- (ii) Write numbers to a given number of significant figures
- (iii) Tell the difference between significant figures, decimal places and place values.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES FOR THE TEACHER /METHODOLOGY
13.	Approximation and Estimation	"Rough" answers. "Sensible" answers Significant figures Decimal places	2 4 4	SMU Bk. 1 Ch. 8 MKS Bk. 1 Ch. 8 GMSS Bk. 1	This should be continually revised throughout the O' level course. Emphasis be put on the difference between significant figures and decimal places.

--	--	--	--	--	--

TOPIC 14: COMMERCIAL AND HOUSEHOLD ARITHMETIC:

Specific Objective: Define the terms profit, loss, commission, interest, insurance and discount.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
14.	Commercial and Household Arithmetic	a) Profit and loss, commission, insurance, interest and discount b) Currency and exchange rates sources.	2 4	SMU Bk 1 Ch. 10 MKS Bk. 1, Ch. 18 SMUSS Bk. 2 Ch. 5 GMSS Bk. 1	Household bills and accounts Postage Uganda shillings related to partner PTA states e.g. Kenya Tanzania. Conversion rates e.g. for dollar, pounds-sterling. NB. Give simple examples. Let the learner role play the buying and selling of items.

TOPIC 15: BEARING

Specific Objectives:

- (i) Choose and use an approximate scale.
- (ii) Interpret a given scale
- (iii) Draw suitable sketches from the given information.
- (iv) Describe the bearing of a place from a given point
- (v) Tell the difference between a sketch and a scale drawing.
- (vi) Apply bearings in real life situations.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
15.	Bearings	Simple scale drawing and measurement. Knowledge of notations e.g. N 30° W and 330° to describe a	4 4	SMEA Bk 1 Ch. 6 SMU Bk 2 Ch. 6	Emphasize the North line and measurement using a protractor. Learners can do some examples outside the class.

	bearing.		GMSS, Bk. 1	
--	----------	--	-------------	--

TERM III

TOPIC 16: GENERAL AND ANGLE PROPERTIES OF GEOMETRIC FIGURES.

Specific Objectives:

- (i) Name and identify different angles.
- (ii) Solve problems involving angles on a straight line, angles on a transversal and parallel lines.
- (iii) State and use angle properties of polygons in solving problems.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
16.	General and Angle Properties of Geometric Figures	(a) Types of angles:- - Angles on a straight line - Angles at a point - Angles in the context of parallel lines. (b) Angle properties of polygons e.g. - Triangles - Quadrilaterals - Pentagons, Hexagons and other polygons. - Exterior and Interior angles of regular polygons.	8	MKS Bk. 1 Ch. 20 SMEA Bk 1 Ch. 6, SM Bk. 1 SMU Bk 2 Ch. 1 SSM Bk 1 Ch. 8	Let learners draw sketch diagrams of the polygons. Help the learner identify the formulae for exterior and interior angle sum.

TOPIC 17: DISTANCE/TIME, SPEED/TIME GRAPH I**Specific Objectives:**

- (i) Draw a distance time graph
- (ii) Read and interpret the graph

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
17.	Distance/Time Speed/Time Graph I	Use real life statistics where possible. Learners should be able to answer questions using the graph, straight lines	8	GMSS Bk. SMU Bk 4 Ch. 3, MKS Bk. 2 Ch. 17 SMUSS Bk. 2 Ch. 3	Plotting of simple straight line graphs on graph papers.

TOPIC 18: STATISTICS 1 (COLLECTION AND REPRESENTATION OF DATA)**Specific Objectives:**

- (i) Define statistics, data frequency, bar chart, pie chart and line graph
- (ii) Collect and organize data in tabular forms.
- (iii) Draw bar charts, pie charts, pictograms and line graph.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
18.	Statistics I collection and Representation of Data	a) Tabulation b) Frequency distribution c) Bar charts d) Pie Charts e) Pictorial representation	12	SMEA Bk 2 SMU Bk 1 Ch. 14	Use everyday examples Learners to be involved in collection and interpretation of data.

TOPIC 19: ALGEBRA**Specific Objectives:**

- (i) Expand algebraic expression
- (ii) Manipulate simple algebraic equations in one variable and express the answer in a set form.
- (iii) Calculate simple linear inequalities.
- (iv) Tell the difference between an equation and inequality.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
19	Algebra	a) Expansion of brackets b) Meaning of a variable and simple substitution. c) Simple linear equations and inequalities	4 2 4	SMUSS Bk 2 Ch. 11 MKS Bk. 1 Ch. 4 MKS Bk. 1 Ch. 10	Practically solve the equations. Simple substitutions Integral solutions

TOPIC 20: REFLECTION**Specific Objectives:**

- (i) Identify lines and planes of symmetry for different figures.
- (ii) State and use properties of reflection as a transformation.
- (iii) Make geometrical deductions using reflection (distinguish between direct and opposite congruence).
- (iv) Apply reflection in the Cartesian plane.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
20	Reflection	a) Knowledge of the terms symmetry, image, line of symmetry, mirror line, mediator and angle bisector. b) Properties of reflection in a plane mirror concept of congruence	8	SMU Bk 2 Ch. 7 SMEA Bk 1 Ch. 13	- Demonstrate using a mirror - Activities involving paper folding along mirror lines. - Design tasks for learners so that they can find out the properties.

TOPIC 21: EQUATIONS OF LINES AND CURVES**Specific Objectives:**

- (i) Form linear equations with given points.
- (ii) Draw the graph of a line given its equation
- (iii) Tell the difference between a line and a curve.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
21.	Equations of lines and curves	a) Linear equations Drawing a line and forming equations of lines	4	MKS Bk 2	- Make use of graph books. - Forming equations with points such as (2, - 2), 3, - 3), 4, - 4), (5, - 5) by identifying the relationship. (Do not use gradients method).
		b) Curves: - Forming equations from a set of points - Drawing a curve from the set points.	4	SMEA Bk 1 Ch. 11	

SENIOR TWO TERM I

TOPIC 1: ALGEBRA: USE OF SYMBOLS, SUBSTITUTION

Specific Objectives:

- (i) Build a formula from the word problems.
- (ii) Use symbols to represent numbers
- (iii) Use correct notational convention for formula.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
1.	Algebra: Use of symbols. Substitution	a) Arithmetic relations in symbols Building a formula using symbols.	4	SMU Bk 1 Chapter 4 SMUSS Bk 3 Ch. 11 SMUSS Bk. 2 Ch. 1	Let learners cite as many examples known to them as possible e.g. Area of rectangle. $A = l \times b$ Area of triangle = $\frac{1}{2} \times b \times h$
		b) Substitution in simple formulae	2	SMM Bk 3 Ch. 3	Learners should get plenty of practice in stating formula in words and also vice versa. Revise S.1 work.
		c) Finding y in terms of x where y is not explicitly defined (e.g. $2x + y = 7$)	4	SSM Bk 2 Ch. 2	

TOPIC 2: MAPPING AND RELATIONS

Specific Objectives:

- (i) Describe a mapping and a relation
- (ii) Draw arrow diagrams and Papygrams.
- (iii) Tell the difference between a Papygram and an arrow diagram.
- (iv) Identify domain and range mapping.
- (v) Tell the difference between a function and non-function mapping.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
2.	Mappings and relations	Mappings as Algebraic Relations – Linear first (i) Arrow diagrams (ii) Domain and Range (iii) Orders of Mapping	4 2	SMU Bk 2 Ch. 3 SMEA Bk 2 Ch. 3 SSM Bk 2 Ch. 3 Bk. 3 SMUSS Bk. 2 Ch. 2	Use every-day relations to introduce the concept: e.g. ' is the father of ' 'is bigger than' and specify the set under consideration in each case e.g. [' is bigger than on the set {2,3,4,5,}
		A function as a special type of mapping:- e.g. one-to-one Many-many. $f(x)$ notation and values of functions e.g. $f(0), f(3), f(-1)$ for simple functions	4	SMU Bk 2 Ch. 3 SSM Bk 2 Ch. 4	Link up graph work in S.1 to that of S.II. Point out that $f(x)$ is another form of 'y'

TOPIC 3: NUMERICAL CONCEPTS

Specific Objectives:

- (i) Define and identify rational numbers and work out problems involving rational numbers.
- (ii) Define and identify irrational numbers
- (iii) Identify real numbers
- (iv) Convert recurring decimals into fractions

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	TEACHING AND LEARNING STRATEGIES
3.	Numerical Concepts	Identification of:- (i) Rational Numbers	2	SMEA Bk 2 Ch. 10	The set { Rational Numbers} = Q Numbers that can be expressed in the form $\frac{p}{q}$ where P and q are integers q $q \neq 0$ e.g. $\frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{7}{9}$ (The set {Irrational Numbers} = Q' Numbers that cannot be expressed as above. e.g. $\sqrt{2}, \sqrt{5}, \sqrt{7}, \sqrt{3}$. The set {all Rational and Irrational Numbers found on the number line} = R Discuss the inclusion/exclusion of zero in the sets above.
		(ii) Irrational Numbers (include recurring decimals)	2	SSM. Bk. 2 Ch. 5	
		(iii) Real numbers	2	MKS Bk 1 Ch. 3	

TOPIC 4: BUSINESS ARITHMETIC

Specific Objectives:

- (i) Calculate profit and loss
- (ii) Express profit and loss as percentage
- (iii) Calculate discount and commission
- (iv) Calculate simple interest and compound interest using step by step method.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTE TO THE TEACHER/METHODLOGY
4.	Business Arithmetic,	(i) Discounts Commission Household Budgeting	4	SMU Bk 2 Ch. 8 SMU Bk. 3 Ch. 5	Review S.1 work Banker's discount ,true discount and related calculations; given sufficient data only knowledge of terms and mathematical manipulations are needed. (Must not be taken to the depth of this topic as in Commerce or Principles of Accounts) Profit and loss in buying and selling Percentages in profit and loss, selling price. Cost price Problems involving simple interest distinguish between simple and compound interest. The formula should not be used in compound interest also calculations should not involve more than two years.
		(ii) Percentages-profit and loss	4	SMK Bk 2 Ch. 13	
		(iii) Simple interest	2	SMUSS Bk 2 Ch. 5	
		(iv) Compound interest	2	GMSS Bk. 1	

TOPIC 5: VECTORS AND TRANSLATION 1

- Specific Objectives:**
- (i) Define translation.
 - (i) Identify scalars and vectors
 - (ii) Use vector notation
 - (iii) Represent vectors both single and combined geometrically.
 - (v) Apply vectors in real life situations

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
5.	Vectors and Translations I	(i) Object, images and translation vector in 2 – dimensions only.	6	SMEA Bk 2 Ch. 4 Pgs 52 – 68 and Bk 3 Ch. 1 Pg 1 to 3 SMU Bk 3 Ch. 7 SMUSS Bk 2 Ch.8 GMSS. Bk 2 Ch. 6	The exercise in this chapter requires learners to find answers from existing diagrams. They should also represent vectors in diagrams. Carry out translations of given vectors on real objects – translations are journeys which involve sliding in a straight line. Find images from objects and vice – versa when the vector of the translation is given. Learners should realise that, in any figure under translation, the displacement vector of one point determines the displacement vectors of all other points. Use squared board or paper, card-board cut-outs or regular/irregular figures.
	Vectors	(ii) Congruence of figures under translation (iii) Symbols $\overrightarrow{AB}$ $\underline{a}$ for vectors	2		Compare with reflections Discuss invariants e.g. size, shape, angles, area. Learners should use symbols correctly

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
		(iv) Equivalent displacement vectors – single translations equivalent to two or more consecutive translations (v) Equal but opposite vectors e.g. $\vec{a}$ and $-\vec{a}$ Addition of vectors and related problems. (vi) The zero vector (vii) Multiples of vectors i.e. $3\vec{a}$ (for example) as a scale factor of 3, applied to the vector (scalar) (viii) Column vector notation Column vectors in diagrams. (ix) Length of vectors	2 2 2	SMU Bk 3 Ch. 3 SMU Bk 3 Ch. 8 SMU Bk 3 Ch. 3 SMEA Bk 2 Ch. 3 SMEA Bk 3 Ch. 1	right from the beginning. Order of naming is important in vectors $\vec{AB}$ is not the same as $\vec{BA}$ Teachers should explain the use of bold type in textbooks and examination papers. Lead to the identity $\vec{AB} + \vec{BC} = \vec{AC}$ after considering several problems. Emphasise the idea of equal journeys in opposite direction. Learners should understand that the zero vector is a combination of vectors or journeys which terminate at the starting point Connect with the idea of equal vectors and with parallel, but unequal vectors. Stress importance of order i.e. $\begin{pmatrix} \mathbf{x} \\ \mathbf{y} \end{pmatrix}$ Pythagoras theorem must be revised before this is done.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
		(x) Operations on vectors: (in column form and in diagrams). Addition of vectors. Simple multiplication and division by constants	2	SMEA Bk 3 Ch. 8 GMSS. Bk 2 Ch. 6	Use diagrams extensively. Use the idea of (scalar multiplication) Factors in multiplication and Divisions.

TOPIC: 6**GRAPHS II****Specific Objectives:**

- (i) Make table of values from given relations.
- (ii) Use the table of values to draw the graphs
- (iii) Define displacement, speed, velocity and acceleration.
- (iv) Tell the difference between distance and displacement.
- (v) Plot graphs of linear motion (distance – time)
- (vi) Interpret information from graphs.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
6.	Graphs II	Distance/Time and Speed/Time graphs – Harder straight lines and simple curves	6	GMSS Bk 1 MKS Bk 1 Ch. 17 SMEA Bk 1 Ch. 12 SMU Bk 4 Ch. 3	Revise straight line graph from S.1 Use real life statistics where possible learners should be able to answer questions using the graphs.

TERM II

TOPIC 7: STATISTICS (MODE, MEAN AND MEDIAN)

Specific Objectives:

- (i) Define mode, mean and median.
- (ii) Identify mode and median for ungrouped data.
- (iii) Use frequency table for ungrouped data and calculate the mean.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
7.	Statistics Mode, Mean, median)	(i) Identification of the Mode and calculations of the Mean of given distributions. Differences between the two averages. (ii) Identifying the median	6	SMEA Bk 2 Ch. 2 & Bk 3 Ch. 13 SMU Bk 2 Ch. 13	Use familiar, real situations and live data generated by learners as often as possible. Do not use grouped frequencies in S.2 . Learners should be able to tell you the difference and select the more appropriate average giving reasons in any situations.

TOPIC 8: INDICES AND LOGARITHMS

Specific Objectives:

- (i) Identify base number and index.
- (ii) State and apply the laws of indices in calculations.
- (iii) Express numbers in standard form.
- (iv) Relate indices to logarithms.
- (v) Relate any other base to logarithms.
- (vi) Use the calculator/tables of common logarithms in computation
- (vii) Work out squares and square roots without tables.
- (viii) Read squares and square roots of numbers using tables

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
8.	Indices and logarithms	(i) Rules for operations on integral indices	2	SMEA Bk 2 Ch. 5 and 6	The addition rule (for e.g.) $a^2 \times a^3 = a^5$ should be discovered by expansion and multiplication. Use numbers rather than letters for indices.
		(ii) Standard form	4	SMU Bk 3 Ch. 1	
		(iii) Use of tables of logarithms for these numbers.	8	SSM Bk 2 Ch. 6	Approximation/estimations is important in all secondary years, but especially so with this topic.
		(iv) Square and square roots from tables	6	MKS Bk 2 GMSS Bk 2 Ch. 1	

TOPIC 9: INEQUALITIES AND REGIONS

Specific Objectives:

- (i) Identify and use inequality symbols.
- (ii) Illustrate inequalities on the number lines
- (iii) Solve the linear inequalities in one unknown
- (iv) Represent the linear inequalities graphically.
- (v) Form simple linear inequalities from inequality graphs.
- (vi) Find the required region

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
9.	Inequalities and Regions	(i) Numerical solutions of simple inequalities e.g. $x \leq 8$	2	SMEA Bk 1 Ch. 11 & Ch. 15	Learners should be able to show this set on number line as well as list members. Emphasise difference between ($\geq$, $<$) All region to be shown by shading unwanted regions – dotting unwanted lines.
		(ii) Regions: Graphs of inequalities, regions bounded by straight lines e.g. $y < 5$, $x > 3$, $x + y < 5$, $x + 2y \leq 5$.	6	SMU Bk 2 Ch. 7 SSM Bk 2 Ch. 14	
	Further inequalities	(iii) Regions for graphs of inequalities such as $x + y < 5$, $x + 2y \leq 5$	6	SMEA Bk 2 Ch.14	

TOPIC 10: ALGEBRA – EXPANSION AND FACTORISATION**Specific Objectives:**

- (i) Expand algebraic expressions.
- (ii) Identify perfect squares
- (iii) Manipulate expressions to get a complete square.
- (iv) Identify different levels of factorization.
- (v) Manipulate the coefficients for factorization.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
10.	Algebra-Expansion and Factorisation	Expansion of Brackets. Factorisation of easy expression of the form $ax + bx, a^2 - b^2, x^2 + 2xy + y^2$ $x^2 - 2xy + y^2$ perfect squares	2 14	SMU Bk 2 Ch. 2, Ch. 12 SMEA Bk. 2 Ch. 12 SMUSS Bk 2 Ch. 13 MKS Bk. Ch. 15	This is revision – learners must be taught to organise their work to the best advantage, i.e. identifying like terms. Expansion of each type has to be done before factorisation and then re-checked by multiplication.

TOPIC 11: RATIO AND PROPORTION**Specific Objectives:**

- (i) Define ratios
- (ii) Describe qualities in ratios
- (iii) Change qualities in a given ratio
- (iv) Define proportion
- (v) Tell the difference between direct and inverse proportions
- (vi) Interpret the given scales
- (vii) Represent and interpret proportional parts.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
11.	Ratio and Proportion.	(i) Ratio as fractions and as sharing in a given ratio. (ii) Scales and Representative Fractions (iii) Proportion	6	SMU Bk 2 Ch. 4 SSM Bk. 2 ch. 17 SMUSS Bk 3 Ch. 7	a:b as a fraction $\frac{a}{b}$ or vice versa Sharing quantities in a given ratio

TERM III

TOPIC 12: SIMILARITIES AND ENLARGEMENT

Specific Objectives:

- (i) Identify similar figures
- (ii) State and use the properties of similar figures
- (iii) Define enlargement
- (iv) State the properties of enlargement to construct objects and images.
- (v) State the relationship between linear, area and volume scale factors.
- (vi) Apply scale factors in real life situation.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
12.	Similarity and Enlargements	Propertities of similar figures. Enlargement in two dimensions Linear Scale Factors:- $\geq +1, 0 \leq S.F \leq 1,$ $- 1 \leq S.F \leq 0, S.F \leq -1$ Area and volume S.Fs Successive Enlargement.	14	SMU Bk 3 Ch. 3 SMEA Bk 2 Ch. 12 GMSS Bk. 2 MKS Bk 2 Ch. 7	Revise similarity before this topic. Learners should discover the results of all types of S.Fs in terms of physical movements of the plane. Enlargement (in Mathematics) can make figures smaller as well as bigger. Discuss the nature of the similarities. Use squared paper or match sticks.

TOPIC 13: THE CIRCLE**Specific Objectives:**

- (i) Identify symmetry properties of the circle
- (ii) Relate and compute angles subtended by an arc at the centre and the circumference.
- (iii) State the theorems of symmetry.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
13	The circle	Symmetry properties of circle.	2	SMU Bk 3 Ch. 6 SSM Bk 2 Ch. 19	Revise primary and S.1 work on circles. Include angles subtended by equal arcs No proofs needed. Discuss properties by drawing/measuring and paper folding.

TOPIC 14: ROTATION**Specific Objectives:**

- (i) State the order of rotational symmetry of plane figures
- (ii) Tell the difference between clockwise and anti-clock wise rotation
- (iii) State properties of rotation as a transformation
- (iv) Determine the centre and angle of rotation
- (v) Apply properties of rotation in the Cartesian plan.
- (vi) Deduce congruence from rotation.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/ METHODOLOGY
14	Rotation	Orders of rotation – rotational symmetry. Centre of rotation.	6	SMU Bk 1 Ch. 15	Learners must do many examples of rotation, starting with solid shapes to establish the concept and proceeding to rotations of plane figures, regular and irregular. Use pins or compasses and graph paper.
		Angle of rotation.		SMU Bk 3 Ch. 2	
		Finding the centre by drawing when object and image are given.	6	SMEA Bk 2 Ch.1 SSM Bk 2 Ch. 20 MKS Bk. 2 Ch. 6	Start with angles of a whole circle (360°) then half circle and then quarter – circle. Proceed to other angles very gradually. Look for invariances Compare with reflections, translations and enlargement.

TOPIC 15: GEOMETRY LENGTH AND AREA PROPERTIES**Specific Objectives:**

- (i) State Pythagoras theorem
- (ii) Solve problems using Pythagoras.

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
15	Geometry Length and Area properties	(i) Linear properties of right angled triangles – Pythagoras theorem. (ii) Areas of regular figures e.g. rectangle, square, triangle, parallelogram	6	SMU Bk 2 Ch. 11 SMEA Bk 2 Ch. 16	Rigorous proofs are not needed, but learners should discover concepts by drawing and measuring.

TOPIC 16: GEOMETRY NETS AND SOLIDS**Specific Objectives:**

- (i) Identify and sketch common solids
- (ii) Identify prism
- (iii) Form nets and solids

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
16	Geometry Nets and solids	Nets, Cubes, tetrahedron, pyramids, triangular prisms, cylinders.	6	SMU Bk 1 Ch. 3 SMEA Bk 1 Ch. 8 Bk 2 Ch. 19	The emphasis should be on practical work – construct nets from wires, sticks, manilla card using tacking pins, sello – tape or adhesives Properties should be discovered from the practical work.

TOPIC 17: NUMERICAL CONCEPTS – INDICES, STANDARD FORM, COMPUTATION AND SURDS

Specific Objectives:

- (i) Express n^{th} root of an integer index form ,
- (ii) Use laws of indices in calculations
- (iii) Work out problems involving large and small numbers.
- (iv) Define absolute, relative and percentage error.
- (v) Determine possible errors made from simple computations.
- (vi) Find maximum and minimum errors from operations
- (vii) Define surds
- (viii) Simplify expressions with surds
- (ix) Rationalize the denominator with surds

NO	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
17.	Numerical concepts	Rules for operation of fractional indices	4	GMSS Bk. 2 Ch. 1	Rules should be discovered by pattern building. Estimation, approximation and significant figures to be used throughout the course.
	a) Indices	Standard form for numbers less than 1 e.g. $A \times 10^n$		SMU Bk 2	
	b) Standard form	Where $1 \leq A < 10$ and n is any integer.	4	Ch. 9 SMU Bk 3 Ch. 1	
	c) Computation	Use of logs for these numbers Techniques for computation e.g. reciprocals	2	SMU Bk 3	
		Further computation – without tables - with tables	6	SMU Bk 4 Ch. 1	
	d) Surds	Simple manipulation of surds Simple identities involving square roots, Rationalization of surds.	4	SMU Bk 4 Ch.1 SSM Bk 2 Ch. 10 Bk 3 Ch. 2	

SENIOR THREE TERM I

TOPIC 1: SETS THEORY

Specific Objectives:

- (i) Define and use the complement set
- (ii) Use Venn diagrams to represent sets and the number of elements in a set.
- (iii) Apply practical situations using two and three sets.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
1.	Set Theory	Use and recognition of all the notation used in S.1 with confidence a) Universal Sets: Selection and description of universal sets, use in problem solving and use of ϵ for Universal Set. b) Complements: Identification and listing of complements of sets and use of symbols A' for complement of A and use of complement in solving problems. c) Venn diagrams: Extension of Venn diagrams to three intersecting sets and solution of problems involving given numbers in sets.	2 2 2 4	SMEA Bk 3 Ch. 6 SMU Bk 3 Ch. 1 SMUSS Bk 3 Ch. 1	Learners should know how sets vary with change in the definition of ϵ.

TOPIC: 2: THE EQUATION OF A STRAIGHT LINE**Specific Objectives:**

- (i) State and use the gradients of a line to find the equation of the line.
- (ii) Determine the equation of a straight line using the X and Y intercepts.
- (iii) Apply the relationship of gradients of parallel and perpendicular lines to get the equation of a straight line.
- (iv) Determine the equation when a line is given on the graph.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
2.	The Equation of a straight line	(i) Gradient of a line. (ii) Equation of a line given – Gradient and y – intercept (ii) Given two points	6	SMUSS Bk. 3 SMEA Bk 4 Bk 3 Ch 4 Ch. 1 SMU Bk 2 Ch. 5 SMU Bk 2 Ch. 16 SSM Bk 3 Ch. 5 Ch. 3	- Review S.1 work - Equation of a line in form of $y = mx + c$ - Bring out the conditions of perpendicular and parallel lines.

TOPIC” 3: SINE, COSINE AND TANGENT:

Specific Objectives:

- (i) Define sine, cosine and tangent ratios from right angled triangles.
- (ii) Read and use tables and calculators to find trigonometrical ratios
- (iii) Use sine, cosine and tangent in calculating lengths of sides and angles of triangles.

SN	TOPIC	DETAILS	NO. OF PERIODS	REFERENCES	COMMENTS
3.	Sine, cosine and tangent	From right angled triangles, as ratios of sides of these triangles.	8	SMU Bk 2 Ch. 15 SSM Bk 3 Ch.4 SMUSS Bk. Ch. 4 GMSS Bk. 3 Ch. 4	Derived by drawing and not by definition. 1 st Quadrant only.

TOPIC 4: DATA COLLECTION/DISPLAY

Specific Objectives:

- (i) Draw frequency tables for grouped data.
- (ii) Calculate mean using assumed mean
- (iii) Calculate mode and median.
- (iv) Draw a histogram and use it to estimate mode.
- (v) Form cumulative frequency distribution table, construct, give and use it to estimate the median.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
4.	(i) Data collection/display	a) A critical look at the ways in which data is collected and displayed in particular situations and examination of conclusion arrived at objectively (include Frequency polygons and histograms)	2	SMU Bk 4 Ch. 6	Discussion of specific displays and modes of collection is essential
		b) Frequency tables For ungrouped data and use of the ' Σ ' notation is needed	2	SMU Bk 4 Ch. 6	' Σ ' (sigma) summation notation
	(ii) Mean from Grouped Data	Grouped frequency tables, THE MEAN using mid – intervals, assumed mean method	6	SMU Bk. 4 Ch. 6	The selection of mid intervals needs thorough discussion
	(iii) Median	The median value from a group of values, mode from grouped data. Graphical presentation.	6	SMEA Bk 3 Ch. 13 SMU Bk2 Ch. 13 SMUSS Bk. 3 MKS Bk. 4 Mks Bk 2 Ch.18	Use concrete examples as in SMEA Bk 3 Page 193 – 4 and SMU Bk. 2 Ch. 13. Nails or pencils or sticks of varying length can be used. Also, use learners themselves. Initially, use odd numbers of values to display the median. Stress need for ordering values.

TOPIC: 5 VECTORS

Specific Objectives:

- (i) Define position vector geometrically and as a column vector.
- (ii) Find the vector of a directed line segment when position vectors of the end points are known.
- (iii) Find the position vector of the mid-point of the line segment.
- (iv) Use vector method in dividing a line proportionately internally and externally
- (v) Use vector to show parallelism
- (vi) Use vector methods to show collinearity

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
5.	Vectors	(i) Position vectors as journeys of the same vector from the origin.	2	SMU Bk 3 Ch. 7 SMEA Bk 3 Ch. 1	Stress distinction between free vectors and position vectors $\mathbf{a} - \mathbf{b} = \mathbf{a} + -\mathbf{b}$ must be done with diagrams and in column vectors. The identity $\mathbf{AB} - \mathbf{AC} = \mathbf{CB}$ in a triangle of vectors is useful but not essential.
		(ii) Operations on vectors Extension to subtraction using the additive inverse.	2		
		(iii) Mid point of a vector and use of the mid – point as well as the four basic operations on vectors to name and locate points in simple geometrical problems. Extension to division of vectors in simple ratios such as 1:2, 3:1, 2:3	6		
				SMUSS Bk 3 Ch. 6	Application in problems/diagrams is more important than consequent number work. Ratio should be easily divisible.
					Stress the existence of a common point in collinear points.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
		(iv) Parallel vectors & Collinear vectors. Parallel and collinear points, similarities and sufficient conditions for either.	6	GMSS Bk 3 Ch. 22	Complicated proofs are not useful. Use a parallelogram of vectors to demonstrate.
		(v) Position the vector of a point. The position vector of a point which is the mid – point of a line joining two points, the position vectors of which are given.	2	SMU Bk 3 Ch. 8.P. 137 SSM Bk. 3 Ch. 8	

TERM II

TOPIC 6: PROPORTION

Specific Objectives:

- (i) Work out solutions for direct and inverse proportions
- (ii) State Joint and partial variations.
- (iii) Apply joint and partial variations in solving problems.
- (iv) Define the line of best fit.
- (v) Draw a line of best fit for the given data.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
6	Proportion	Unitary method and simple fractional method. Direct and inverse proportion. Finding a:d and c:d are given and c is multiple.	6 8	SMEA Bk. 3 ch. 2 SMU Bk 2 Ch. 4 SMU Bk 3 Ch. 10 GMSS Bk 3 Ch. 9	Use graphs where possible. Consider joint and partial proportions.

TOPIC: 7: BUSINESS MATHEMATICS**Specific Objectives:**

- (i) Tell the difference between compound interest and simple interest.
- (ii) Calculate compound interest using step by step method.
- (iii) Apply the compound interest formula for calculating interest.
- (iv) Define and calculate hire purchase.
- (v) Tell advantages and disadvantages of hire purchase
- (vi) Define Mortgage.
- (vii) Calculate income tax given income tax bands.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
7.	Business Mathematics	Hire purchase, income per head, taxable income , Pay as You Earn (PAYE) other taxes, e.g. direct and indirect, local taxes, City Council rates, mortgage	8	SMEA Bk 3 Ch. 14 SMU Bk 3 Ch. 9 GMSS Bk 3 Ch. 18	This should be a discussion lesson (liase with business people, Banks and shops).

TOPIC 8: MATRICES

Specific Objectives:

- (i) Define a matrix
- (ii) State the order of a matrix
- (iii) State types of matrices
- (iv) Determine compatibility in addition and multiplication of matrices.
- (v) Find determinant of a 2×2 matrix
- (vi) Find the inverse of a 2×2 matrix
- (vii) Use matrices to solve simultaneous equations.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
8	Matrices	(i) Matrices as a store of information, types of matrices.	2	SMU Bk 3 Ch. 11	Use familiar examples e.g. pocket money of children in a family.
		(ii) Order of matrices		GMSS Bk. 3 Ch. 8 MKS Bk 3 Ch. 18	Use of counters for each learner. Emphasize the order of matrices. Learners should invent matrices of various orders from real – life examples.
		(iii) Addition and subtraction of matrices: Combination of matrices where addition is possible and meaningful Scalar multiplication.	2	SMUSS Bk 3 Ch. 9	Demonstrate how matrices which are totally unrelated can be added to give meaningless numbers.
		(iv) Matrix multiplication: Multiply matrices and use		SSM Bk 3 Ch. 11 SSM Bk 4 Ch. 4	Start with single row and column matrices. Stress the importance of recognizing what you wish to

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
		multiplication in problems where such multiplication is possible and meaningful. (v) Determinant of 2×2 matrix (vi) Inverse of a 2×2 matrix (vii) Solving simultaneous equations using matrix	4		find out and how the matrices can be used to fulfill a necessary calculation – vocabulary – ‘pre-multiply’. Use identity matrix. Establish by pattern building Investigate the role of the determinant in the finding of the inverse matrix – let learners find out what happens in general if the determinant is ignored when inverse matrices are identified.

TOPIC: 9 PROBABILITY

Specific Objectives: Define random, experiment, outcome, sample space, event and probability.

- (i) Construct the probability space.
- (ii) Determine probability from experiment and real life
- (iii) Tell the difference between theoretical and experimental probability.
- (iv) Identify mutually exclusive and independent events.
- (v) State theorems of probability
- (vi) Calculate the probability of compound events using Venn diagrams.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
9.	Probability	(i) The difference between experimental and theoretical probability	2	SMEA Bk 3 Ch. 9 Ch. 8 and SSM Bk 4 Ch. 20	Let the learners do the experiments and not just talk about them. Use simple everyday examples e.g. (dice, cards, match sticks, drawing pins)
		(ii) Theoretical probability: from equally likely outcomes	2	SMUSS Bk 3 Ch. 10	Learners should be encouraged to discuss which are/are not equally likely outcomes in a given situation. Vocabulary: " Possibility space" Work out simple probabilities using the diagram. Learners need a great deal of experience at this. Revise first Venn diagrams and statistics if necessary.
		(iii) Possible outcomes of experiments	2	GMSS Bk 3 Ch. 12 & 20	
		(iv) Possibility space in Cartesian	2		
		(v) Probability using tree diagrams.	2		
		(vi) Probability from simple Venn diagrams and statistics	2		
			4		

TOPIC 10: ALGEBRAIC – EXPRESSIONS, EQUATIONS AND INEQUALITIES.

Specific Objectives:

- (i) Build the formula from word problems
- (ii) Re-write a given formula by changing the subject.
- (iii) Work out expressions involving inequality symbols.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
10	Algebraic Expressions, Equations and Inequalities	(i) Substitution in Simple formulae. (ii) Expressing one physical quality in terms of others. (iii) Change of subject of formulae (iv) Word problems leading to simple linear equations and inequalities. (v) Change of subject harder examples e.g. $v = \pi r^2 h$ $V = \frac{4}{3} \pi r^2$	4 6	SMU Bk 2 Ch. 7 SMUSS Bk 3 Ch. 11 GMSS Bk 3 Ch. 3 SSM Bk 3 SMEA Bk 4 Ch. 2 SMEA Bk. 3 Ch. 4	Revision of S.2 work Simple formulae for area, volumes of regular figures e.g. Circle: $A = \pi r^2$, $V = L \times b \times h$ $A = \frac{1}{2} bh$ Learners should be encouraged to represent word problems as equations and vice versa

TERM III

TOPIC: 11 QUADRATIC EQUATIONS

Specific Objectives:

- (i) Solve quadratic equations using factorization, completing square and formula.
- (ii) Make tables of values from a quadratic equation using graphs.
- (iii) Solve quadratic equations using graphs
- (iv) Form and solve quadratic equations from roots and given situations.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/ METHODOLOGY
11.	Quadratic Equations	a) Solving quadratic equations by - Factorization - Completing the square - Quadratic formula - Graphic method	12	MKS Bk. 3 Ch. 5 SMU Bk 3 Ch. 8 SSM Bk 3 Ch. 14 GMSS Bk 3 Ch. 5 SMUSS Bk 3 Ch. 11	Use plenty of examples, UNEB past papers are a possible source. Co-efficient and roots of quadratic equations should be considered Begin with functions which are easily factorized e.g. $x^2 + 3x = 0$

TOPIC: 12 CIRCLES

Specific Objectives:

- (i) Identify arc, chord, sector and segment.
- (ii) Relate angles made by an arc at the circumference and centre.
- (iii) State the angle in the semi-circle
- (iv) State the properties of a cyclic quadrilateral.
- (v) Find the length of the common chord.
- (vi) Calculate area of sector and segment.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
12	The Circle	(i) angle at centre = 2 times angle at circumference. (ii) angles in same segment (iii) angle in a semi – circle (iv) cyclic quadrilaterals (v) tangent from a point to a circle (vi) alternate segment property. (vii) Chord properties, areas of segments and sectors	10	SMEA Bk 2 Ch. 16 SMEA Bk. 4 Ch, 3 SMU Bk 3 Ch. 6 GMSS Bk 3 Ch. 14 SMUSS Bk 3 Ch. 14 SSM Bk 4, KBZ Ch. 19 Ch. 10 MKS Bk. 3 Ch. 7 Ch. 11 & 12	To be found by drawing, measurement and symmetry No formal proofs required

TOPIC 13: BEARING**Specific Objectives:**

- (i) State the difference between angles of depression and elevation.
- (ii) Apply the knowledge of trigonometric ratios to find angles of elevation and depression.
- (iii) Apply the knowledge of trigonometrical ratios to real life situations.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
13.	Bearing	Angles of elevation and depression with reference to a horizontal plane	6	SMU Bk. 2 Ch. 6 SMEA Bk 3 Ch. 4 Bk. 1 Ch. 6 SMUSS Bk 3 Ch. 4 SSM Bk. 11 SSM Bk 3 Ch. 18	Revision of S.1 work Use real life situations.

TOPIC 14: AREAS AND VOLUMES OF SOLIDS**Specific Objectives:**

- (i) State units of measures
- (ii) Convert units from one form to another
- (iii) Calculate surface areas of three dimensional figures
- (iv) Calculate the volume of some figures (e.g. cubes and pyramid).

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
14.	Areas & Volumes of solids	Surface areas and volumes of solids e.g. (prism, cylinder, right pyramid and right cone) and sphere.	10	SMUSS Bk 3 ch. 15 SMU Bk. 3 Ch. 13 SMEA Bk 2 Ch. 9 SMEA Bk 3 Ch. 10 SSM Bk 4 Ch. 13	Emphasis should be on the difference between surface area and volume.

TOPIC 15: FURTHER TRANSFORMATIONS**Specific Objectives:**

- (i) Identify similar transformations.
- (ii) Identify and state invariants for reflection, rotation and enlargement
- (iii) Define and distinguish isometric and non-isometric transformations,
- (iv) Perform successive transformations.
- (v) Identify order of transformation
- (vi) Identify the resulting single transformation.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
15.	Further Transformations	(i) Similarities and congruencies (ii) Invariants (iii) Isometrics and symmetries (iv) Combination of transformations	10	SMEA Bk 3 Ch. 8 SMU Bk. 4 Ch. 5 SSM Bk 3 Ch. 20 GMSS Bk 3 Ch. 16	Discuss these concepts in connection with all transformations done in S.1, S.2 and S.3

TOPIC 16: SIMULTANEOUS EQUATIONS**Specific Objectives:**

- (i) Solve simultaneous equations using substitution and elimination.
- (ii) Draw graphs of simultaneous equations and find the solution.
- (iii) State the difference between linear equation and quadratic equation.
- (iv) Draw the graph of the line and the curve and solve the two equations from the graph.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
16.	Simultaneous equations	Using: (i) Substitution method. (ii) Elimination method (iii) Graphic method.	12	SMU Bk 2 Ch. 16 SMUSS Ch. 1 Bk 2 Ch. 14 SMEA Bk 4 Ch. 3 SSM. Bk 4 Ch. 5	- Both Linear - One linear and another quadratic.

SENIOR FOUR TERM I

TOPIC 1: MATRICES OF TRANSFORMATION

Specific Objectives:

- (i) Determine and state matrices for the transformation: Reflection, rotation and enlargement.
- (ii) Relate image and object under the given transformation on a Cartesian plane.
- (iii) Identify the matrix of transformation when the object and its image are given.
- (iv) Relate identity matrix and transformation matrix
- (v) Determine the inverse of a transformation matrix
- (vi) Use the inverse matrix to find the object when the image is given.
- (vii) Identify the relationship between area scale factor and determinant of the transformation matrix.
- (viii) Determine and identify a single matrix for successive transformations.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
1.	Matrices of Transformations	Identification of the matrices of:- Enlargements, Reflections and Rotations Using base vectors	14	Bk.4 Ch. 1 SMEA Bk 3 Ch. 14 GMSS Bk 3 Ch. 16 SMUSS Bk 4 Ch. 2 SSM Bk 4 Ch. 1 MKS Bk. 4 Ch. 1	Learners should discover the link between base – vectors (unit square) & matrices of transformations by drawing objects and images and observing patterns Draw attention to invariants under each transformation. Discuss similarities & congruence (Define isometrics and symmetries)

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
		a) Combined Transformations:- combinations of up to three transformations and the single rule, combined matrix of up to three successive transformations.	6	SMU Bk. 5 Ch. 5 SMEA Bk. 4 Ch. 6 SSM Bk 3 Ch. 9	Stress the importance of order of events in transformations as well as the combination of matrices under multiplication.

TOPIC 2: COMPOSITE FUNCTIONS**Specific Objectives:**

- (i) Find the inverse of a function.
- (ii) Find composite functions
- (iii) Identify and find the value of the unknown when the statements are not clearly defined.

SN	TOPIC	DETAILS	NO. OF PERIODS	REFERENCES	COMMENTS
2	Composite Functions	$fg(x)$ from simple functions already encountered leading to more complicated functions. Numerical values of $gf(x)$, $fg(x)$ and inverse functions	6	SMEA Bk. 3 Ch. 3 SSM Bk 4 Ch.3	Emphasize:- 1) the importance of order (link up with transformations & matrices) 2) $gf(x) \neq fg(x)$ (again link up with matrices and transformations).

TOPIC 3: EQUATIONS AND INEQUALITIES**Specific Objectives:**

- (i) Draw number line, and use it to find solutions of inequalities.
- (ii) Work out expressions involving inequalities.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
3.	Equations and Inequalities	a) Solutions of harder inequalities – integral & fractional solutions. b) Similarities and differences between solutions of inequalities and equations (e.g. – multiplying both sides of inequalities by a negative number)	5 5	SMEA Bk 1 Ch. 15 SMEABk. 4 Ch. 4 Ch. 7 SMU Bk 2 Ch. 7 SSM Bk 3 Ch. 13	Encourage the use of the number – line to show solution sets and to check solutions by picking out members of the solution set on the number line.

TOPIC 4: LINEAR - PROGRAMMING**Specific Objectives:**

- (i) Form linear inequalities based on real life situations.
- (ii) Represent the inequalities on the graph
- (iii) Show the required region of the inequalities.
- (iv) Solve and interpret the optimum solutions of the linear inequalities.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	COMMENTS
4.	Linear Programming	(i) Forming inequalities (ii) Drawing & shading of regions defined by sets of inequalities e.g. $y < 5$; $x + 2y > 5$ $x > 0$ (i.e. intersection of the three sets) (iii) Problems involving the maximum or minimum values of function of 2 variables within a given region - integral values by inspection.	16	SMEA Bk 4 Ch. 7 SMUSS Bk. 4 Ch. 4 SSM Bk. Ch. 7 UNEB Past papers SMU Bk 4 Ch. 10	Shade out unwanted regions Dot unwanted lines Encourage learners to draw and shade the region one after another Use graph books

TOPIC 5: ALGEBRA**Specific Objective:** Solve harder quadratic equations using all the methods.

SN	TOPIC	DETAILS	NO. OF PERIODS	REFERENCES	COMMENTS
5.	Algebra	(i) Expansions and Factorizations – harder examples (ii) Identities e.g. $a^3 + b^3$; $a^3 - b^3$ (iii) Solution of quadratic equations by factors	10	SM Bk 2 Ch. 15 SMU Bk 3 Ch. 8 SSM Bk 4 Ch. 6	Revise earlier work and then extend Do expansions before factorization of identities such as $a^3 + b^3$ Proofs are not needed Harder quadratic expression e.g. $3x^2 + 10x + 3$ should be included.

TERM II

TOPIC 6: RATE OF CHANGE

Specific Objectives:

- (i) Tell the difference between rate of change and gradient.
- (ii) Find the gradient between any two points on a curve.
- (iii) Find the average rate of change
- (iv) Determine the gradient of a curve at a point using a tangent.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
6.	Rate of Change	Estimation of the gradient of a curve from tangent. Variable rate of change	8	SMEA Bk. 4 Ch. 4 SSM Bk . 4 Ch. 9 UNEB past papers SMU Bk 4 SSM Bk 3 Ch. 6	Use distance/time graph Please note that results may be very variable and inaccurate. Discuss why.

TOPIC 7: AREA UNDER A GRAPH**Specific Objectives:**

- (i) Find area under a graph by counting squares
- (ii) Apply trapezium rule
- (iii) Interpret – speed- time and distance – time graphs.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
7	Area under a graph	(i) Methods of estimation counting squares etc. (ii) Interpretation – especially speed/time graphs, distance/ time graphs. (iii) Identify conditions for vehicles meeting from opposite direction and the same station	6 14	- SMEA Bk 4 Ch. 7 - UNEB past papers - SMU Bk. 4 Ch. 3 - GMSS Bk. 3 Ch. 13	Use straight-line graphs initially and show how the triangular area under the graph actually multiplies speed by time to give distance. Emphasize the importance of the units in speed and time being in the same units of time e.g. meters/second & seconds

TOPIC 8: EXTENSION OF TRIGONOMETRY**Specific Objectives:**

- (i) Draw a unit circle.
- (ii) Find trigonometric ratios of angles greater than
- (iii) Draw graphs of $y = \sin \chi^\circ$, $y = \cos \chi^\circ$ in interval of 0° to 360°
- (iv) Use the graphs to read sine and cosine rule for any triangle.
- (v) Apply sine and cosine rule in solving real life problems.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
8.	Extension of trigonometry	(i) Extend Sine, Cosine and tangent to 2 nd , 3 rd and fourth quadrants. (ii) Graphs of sine & cosine. (iii) Cosine and sine rules.	14	SMEA Bk 3, Bk 3 Ch. 6 Ch. 11 SMB Bk. 3 Ch. 35 MKS Bk. 3 Ch. 19 Ch. 3 SMU Bk 4 CH. 4 GMSS Bk 3 Ch. 4 SMUSS Bk. 4 Ch. 7	Use the unit circle to establish relationships from the 1 st quadrant to other quadrants. Concentrate on familiar angles initially, i.e. 30° , 90° , 45° , 60° and 90° . Proof of cosine and sine rules not required. Look for symmetries in sine/cosine graphs.

TERM III

TOPIC 9: LOCI

Specific Objectives:

- (i) Define locus
- (ii) Describe common types of loci
- (iii) Construct loci involving points under given conditions.
- (iv) Construct intersecting loci
- (v) Construct loci involving inequalities.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODLOGY
9.	Loci	a) Standard loci (i) Fixed distance from a fixed point (ii) Fixed distance from a given line (iii) Equidistant from 2 given points (iv) Equidistant from 2 intersecting lines (v) A segment of circle containing a given angle. (vi) Constructing problems involving these loci.	12	SMEA Bk 4 Ch. 8 SM Bk 2 Ch. 19 & 38 SMU Bk 2 Ch. 14 SMUSS Bk 4 Ch.8 UNEB Past papers	Use everyday examples where possible. Make sure that learners have encountered the alternate segments property. Inscribed and circumscribed circles of a given triangle should be included.

TOPIC 10: LINES AND PLANES IN THREE DIAMENSIONS**Specific Objectives:**

- (i) Apply Pythagoras theorem to calculate the distance between two points
- (ii) Identify a common point
- (iii) Find the angle between a line and a plane
- (iv) Find the angle between two planes.

SN	TOPIC	CONTENT	NO. OF PERIODS	REFERENCES	NOTES TO THE TEACHER/METHODOLOGY
10.	Lines & Planes in three dimensions	(i) Estimation of angles between lines and planes then calculation. (ii) Angles between planes – Estimation followed by calculation.	11	SMEA Bk 4 Ch. 2 Bk. 3 Ch. 10 SMU Bk 4 Ch. 7	(i) Use 3 – D models as learning aids (ii) Use natural planes in the environment – e.g. an open door, a half – closed window.

REFERENCES

J.B Channon, A Acheish Smithet H.C Head, F.C Heade, M.F Macrae, P.W Kubui; Book 1, 2, 3. Karugaba, C.Olley, *School Mathematics for Ugada Secondary Schools*, (SMUSS) Book 2, 3 and 4
N.M Patel; *Mathematics for Kenya Schools* (MKS) Books 1, 2, and 3; Revised and Published 2003, 2004.
Mathematics Revision Course for UCE (MRC) Fountain Uganda
Mathematics (An intergrated Approach) Macmillan UK.
Secondary Mathematics for Uganda (SMU) Books 1 , 2, 3, 4; Evans UK.
Secondary School Mathematics (SSM) Book 1, 2, 3, 4 Edition, published (1995 – 1998), MACMILLAN UK
School Matehmatics of East Africa (SMEA) Books 1 – 4 Reprinted 2003 – 2005; CAMBRIDGE UK.
UCE Essential Mathematics ,OXFORD UNIVERSITY.

TEACHING/LEARNING AIDS

- Blackboard mathematical instruments set.
- 3 dimension models
- Compass