



Republic of Zambia

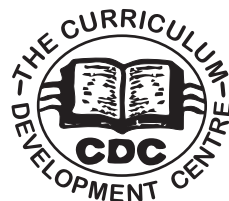
MINISTRY OF EDUCATION, SCIENCE, VOCATIONAL TRAINING AND EARLY EDUCATION

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# MATHEMATICS SYLLABUS

## GRADES 8 AND 9

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## **VISION**

Quality, lifelong education for all which is accessible, inclusive and relevant to individual, national and global needs and value systems.

# TABLE OF CONTENTS

Vision .....	iii
Preface .....	vi
Acknowledgement .....	vii
Introduction .....	viii
Rationale .....	viii
Suggested Teaching Methodology .....	ix
Assesemnt .....	ix
Time and Period Allocation .....	x
General Outcomes .....	x
<b>GRADE 8</b> .....	1
8.1 Sets .....	2
8.2 Integers .....	2
8.3 Approximation and Estimation .....	3
8.4 Ratio and Proportion .....	4
8.5 Algebraic Expressions and Formula .....	5
8.6 Social and Commercial Arithmetic .....	6
8.7 Cartesian Plane .....	7
8.8 Functions .....	7
8.9 Solid Shapes .....	8
8.10 Mensuration .....	8
8.11 Angles .....	9
8.12 Geometrical Construction .....	10
8.13 Statistics .....	11
8.14 Number Bases .....	12
8.15 Computers .....	12

<b>GRADE 9</b> .....	13
9.1 Square Roots and Cube Roots .....	14
9.2 Index Notation .....	14
9.3 Real Numbers .....	14
9.4 Pythagoras' Theorem .....	14
9.5 Directions and Bearings .....	15
9.6 Equations and Inequations .....	15
9.7 Social and Commercial Arithmetic .....	16
9.8 Matrices .....	16
9.9 Mensuration .....	17
9.10 Similarity & Congruency .....	17
9.11 Geometrical Construction .....	18
9.12 Probability .....	18
9.13 Computer .....	18
 <b>Appendix I: Grade 8 and 9 Sequence</b> .....	 19

## PREFACE

The syllabus was produced as a result of the Curriculum review process carried out by the Ministry of Education, Science, Vocational Training and Early Education under the auspices of the Curriculum Development Centre (CDC). The curriculum reform process started way back in 1999 when the Ministry of Education commissioned five (5) curriculum studies which were conducted by the University of Zambia. These studies were followed by a review of the lower and middle basic and primary teacher education curriculum. In 2005 the upper basic education National survey was conducted and information from learners, parents, teachers, school managers, educational administrators, tertiary institutions traditional leaders civic leaders and various stakeholders in education was collected to help design a relevant curriculum,.

The recommendations provided by various stakeholders during the Upper Basic Education National survey of 2005 and National symposium on curriculum held in June 2009 guided the review process.

The review was necessitated by the need to provide an education system that would not only incorporate latest social, economic, technological and political developments but also equip learners with vital knowledge, skills and values that are necessary to contribute to the attainment of Vision 2030.

The syllabus has been reviewed in line with the Outcomes Based Education principles which seek to link education to real life experiences that give learners skills to access, criticize analyze and practically apply knowledge that help them gain life skills. Its competences and general outcomes are the expected outcomes to be attained by the learners through the acquisition of knowledge, skills, techniques and values which are very important for the total development of the individual and the nation as a whole.

Effective implementation of Outcomes Based Education requires that the following principles be observed: clarity of focus, Reflective designing, setting high expectations for all learners and appropriate opportunities.

It is my sincere hope that this Outcomes Based syllabus will greatly improve the quality of education provided at Grade 8 and 9 levels as defined and recommended in various policy documents including Educating Our Future` 1996 and the `Zambia Education Curriculum Framework `2013.



Chishimba Nkosha (Mr.)

**Permanent Secretary**

**MINISTRY OF EDUCATION, SCIENCE, VOCATIONAL TRAINING AND EARLY EDUCATION**

## ACKNOWLEDGEMENT

The syllabus presented here is a result of broad-based consultation involving several stakeholders within and outside the education system.

Many individuals, institutions and organizations were consulted to gather their views on the existing syllabus and to accord them an opportunity to make suggestions for the new syllabus. The Ministry of Education wishes to express heartfelt gratitude to all those who participated for their valuable contributions, which resulted in the development of this syllabus.

The Curriculum Development Centre worked closely with other sister departments and institutions to create this document. We sincerely thank the Directorate of Teacher Education and Specialized Services, the Directorate of Planning and Information, the Directorate of Human Resource and Administration, the Directorate of Open and Distance Education, the Examinations Council of Zambia, the University of Zambia, schools and other institutions too numerous to mention, for their steadfast support.

We pay special tribute to co-operating partners especially JICA in conjunction with Hiroshima University and UNICEF for rendering financial and technical support in the production of the syllabus.



C.N.M Sakala (Mrs.)  
Director-Standard and Curriculum  
**MINISTRY OF EDUCATION, SCIENCE, VOCATIONAL TRAINING AND EARLY EDUCATION**

# INTRODUCTION

This syllabus has been prepared and produced against the background of the need to set high standards for mathematics education and actualize the country's vision from ECE through to Teacher Education. It is a culmination of reviews of existing materials and policies from a number of countries both in Africa and beyond with progressive mathematics education. It also draws from studies, research and the country's policy documents and aspirations.

The following are the underlying principles for the revised Junior Secondary school mathematics syllabus:

- Equity
- Orderly and logical progression
- Varied teaching methodology with subjective learning as the keystone
- Integration of knowledge, skills and values

These syllabus guidelines have been defined at two levels namely the content and process domains. The content domain is defined according to six themes namely; **Numbers & Calculations**, **Algebra**, **Geometry**, **Measures**, **Probability & Statistics** and **Relations**. The process domain on the other hand is defined according to three categories of *knowledge, skills and values*. These two domains constitute the general outcomes of the Mathematics course.

# RATIONALE

Mathematics is an important subject on the Zambian School curriculum. It is featured as one of the core subjects in all the options for both the academic as well as the practical career pathways.

Mathematics enhances the learners' understanding of the world around and prepares them for further education. It also plays a key role as a tool for learning other subjects and learning areas. The subject fosters the development and improvement of learners' intellectual competence in logical reasoning, spatial visualization, analysis and abstract thought. When learners have acquired enough knowledge, skills and values in mathematics they develop reasoning, thinking and problem solving skills. Mathematics is also important in science and technology subjects which are vital for the development of the country. The subject therefore equips the learner to live in the age of Science and Technology and enable them contribute to social, economic development of the country.

Mathematics can also be an interesting subject when learners appreciate basic concepts and insights that will equip them to pursue mathematics education at higher levels.



## SUGGESTED TEACHING METHODOLOGY

This Syllabus for Junior Secondary schools aims at enabling learners acquire mathematical knowledge, values and skills for the further study of the subject at the Senior Secondary level as well as apply it in their daily lives. It is for this reason that teachers should focus on encouraging communication of mathematical ideas among learners, emphasise problem solving and application to real life situations besides cultivating interest in the subjects.

The mathematical concepts and principles presented in this syllabus aim to encourage learners to think logically and critically and make connections between topics and with other subjects. To achieve this, teachers should put emphasis on teaching the subject in a manner where learners communicate their mathematical ideas as well as misconceptions. This approach will enhance learners' understanding and appreciation of mathematical concepts and ideas as they construct their own knowledge. Teachers will also need to refocus their teaching approaches and continuously sharpen their pedagogical skills in line with contemporary approaches in the teaching of the subject.

Further, since Mathematics is a discipline with hierarchical concepts and skills, teachers should present it in a systematic manner. In the design of the syllabus, effort has been made to sequence the topics across the entire course of study. Successful interpretation and implementation of this syllabus however requires flexibility on the part of teachers in order for them to arrange the content in an easy to understand progression so as to improve mathematics education in the country.

## ASSESSMENT

Assessment is an important diagnostic tool in the teaching and learning process used to determine whether teaching and learning have taken place or not. It requires well defined rubrics to facilitate a fair and consistent assessment of learner's work as well as clearly defined performance targets at key stages and during the process of teaching and learning.

Classroom based continuous assessment must form an integral part of the implementation of this syllabus. This is in view of the value that this adds to the modification of instruction delivery thereby contributing to best practices by the teacher. In order to attain this, teachers are urged to employ various techniques of assessment according to the topics and themes at various levels. These methods may include learner observation, projects, tests, portfolios and projects among others.

For terminal assessment, the Examinations Council will provide guidelines on the objectives to be assessed at specific levels both for selection and certification.

## **TIME AND PERIOD ALLOCATION**

This syllabus will require at least 4 hours 40 minutes (seven-40 minutes periods) per week to complete at each level.

## **GENERAL OUTCOMES**

1. To foster the development and improvement of learners' intellectual competence in logical reasoning, spatial visualization, analysis and abstract thought.
2. To equip the learner to live in the age of science and technology and enable them contribute to social, economic development of the country.

## GRADE 8

General Outcomes:	Key Competences:
<ul style="list-style-type: none"><li>▪ Provide clear mathematical <b>thinking</b> and expression in the learner.</li><li>▪ Develop the learners' mathematical and ICT <b>knowledge and skills</b>.</li><li>▪ Enrich the learners' <b>understanding</b> of mathematical concepts in order to facilitate further study of the discipline.</li><li>▪ Build up an appreciation of mathematical and ICT concepts so that the learner can <b>apply</b> these for problem solving in everyday life.</li><li>▪ Enable the learner <b>Represent</b>, interpret and use data in a variety of forms.</li></ul>	<ul style="list-style-type: none"><li>▪ Think mathematically and accurately in problem solving skills and apply these skills to formulate and solve mathematical and other related problems.</li><li>▪ Develop necessary skills needed to apply mathematical and ICT concepts and skills in other disciplines.</li><li>▪ Develop abilities and ideas drawn from mathematics to reason logically, communicate mathematically and technologically, and learn independently without too much supervision (self-discipline).</li><li>▪ Development positive attitudes towards mathematics and use it in other subjects such as science and technology.</li><li>▪ Apply mathematical tools such as information and communication technology in the learning of other subjects.</li><li>▪ Use mathematics for enjoyment and pleasure.</li><li>▪ Develop understanding of algebra, geometry, measurements and shapes.</li></ul>

TOPIC/ THEME	SUBTOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
8.1 SETS	8.1.1 Set builder notation.	8.1.1.1 Interpret the set builder notation; $\{x: x > 2, x \in \mathbb{Z}\}$ .	<ul style="list-style-type: none"> <li>The set builder notation; <math>\{x: x &gt; 2, x \in \mathbb{Z}\}</math></li> <li>Venn diagrams</li> <li>The intersection set (should include up to 3 sets)</li> <li>Set complement including its symbol (i.e. <math>A'</math>, <math>B'</math>)</li> <li>Single set operation symbol (e.g. <math>A \cup B \cup C</math> or <math>A \cap B \cap C</math>).</li> <li>Combined set operation symbols [e.g. <math>(A \cup B') \cap C</math>, <math>(A' \cap B) \cup C</math>, <math>A' \cap (B' \cup C)</math>]</li> <li>Set application in real life situations.</li> </ul>	<ul style="list-style-type: none"> <li><b>Computation</b> of operations on sets</li> <li><b>Interpretation</b> of the set builder notation.</li> <li><b>Problem solving</b> using acquired knowledge of sets.</li> </ul>	<ul style="list-style-type: none"> <li><b>Appreciation</b> of the use of sets.</li> <li><b>Accuracy</b> of classification and in set operations.</li> <li><b>Team work</b> through cooperative learning.</li> </ul>
	8.1.2 Intersection of sets.	8.1.2.1 Find the intersection set involving up to 3 sets.			
8.1 SETS	8.1.3 Complement of a Set.	8.1.3.1 Interpret the set complement including its symbol (i.e. $A'$ , $B'$ )			
	8.1.4 Set Operations.	8.1.4.1 Use single set operation symbols (e.g. $A \cup B \cup C$ or $A \cap B \cap C$ ).			
8.1 SETS	8.1.5 Application on sets.	8.1.5.1 Apply simple operations on sets.			
8.2 INTEGERS	8.2.1 The four operations	8.2.1.1 Add and subtract integers without using the number line.	<ul style="list-style-type: none"> <li>Adding and subtracting integers without using the number line.</li> <li>Multiplying and dividing integers.</li> </ul>	<ul style="list-style-type: none"> <li><b>Computation</b> of integers using the four operations.</li> </ul>	<ul style="list-style-type: none"> <li><b>Accuracy</b> in computing integers using the four rules.</li> </ul>
		8.2.1.2 Multiply and divide integers.			

TOPIC/ THEME	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
8.3 APPROXIMATION & ESTIMATION	8.3.1 Approximation and Estimation.	8.3.1.1 Express numbers to given significant figure. 8.3.1.2 Estimate measures or quantities. 8.3.1.3 Round-off numbers to specified degree of accuracy.	<ul style="list-style-type: none"> <li>Meaning of significant figure (Highlight the Significance of zero).</li> <li>Estimating measures or quantities.</li> <li>Rounding off numbers to given degree of accuracy (nearest unit, given number of decimal places).</li> <li>Scientific notation (i.e. <math>A \times 10^n</math> where n is an integer and <math>1 \leq A &lt; 10</math>).</li> <li>Scientific notation to given degree of accuracy (i.e. specified number of significant figures, decimal places).</li> <li>Concept of approximation in real life (percentages, time, distance, temperature).</li> </ul>	<ul style="list-style-type: none"> <li><b>Identification</b> of significant figures.</li> <li><b>Estimation</b> of numbers to given significant figure.</li> <li><b>Problem solving</b> using approximation in real life.</li> </ul>	<ul style="list-style-type: none"> <li><b>Appreciation</b> of approximations in real life.</li> </ul>
	8.3.2 Scientific Notation.	8.3.2.1 Express numbers in scientific notation or standard form. 8.3.2.2 Approximate numbers in scientific notation to given degree of accuracy			
	8.3.3 Apply the concept of approximation in real life.	8.3.3.1 Apply the concept of approximation in real life.			

TOPIC/ THEME	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
<b>8.4 RATIO &amp; PROPORTION</b>	<b>8.4.1 Ratio and Proportional parts.</b>	8.4.1.1 Solve problems that involve ratio and proportion.	<ul style="list-style-type: none"> <li>• Interpretation of graphs.</li> <li>• Problems in real life situations [e.g. using the representative fractions (RF), Foreign Exchange rates, mapping].</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Computation</b> of problems involving ratio and proportion.</li> <li>• <b>Application</b> of ratio and proportion in solving real life problems.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Team work</b> through cooperative learning.</li> <li>• <b>Accuracy</b> in computations.</li> </ul>

TOPIC/ THEME	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
<b>8.5 ALGEBRAIC EXPRESSIONS &amp; FORMULA</b>	<b>8.5.1 Algebraic expressions.</b>	8.5.1.1 Formulate algebraic expressions. 8.5.1.2 Simplify algebraic expressions. 8.5.1.3 Apply the distributive law in simplifying algebraic expressions.	<ul style="list-style-type: none"> <li>• Relate letters to numbers and/ or vice versa.</li> <li>• Distinguish between variables and coefficients.</li> <li>• Grouping like and unlike terms.</li> <li>• Applying Commutative, Associative and Distributive (CAD) Laws.</li> <li>• Expanding and Factorising algebraic expressions.</li> <li>• Applying the four operations on algebraic expressions.</li> <li>• Evaluating algebraic expressions by substituting variables with numbers.</li> <li>• Applying additive and multiplicative inverses.</li> <li>• Solving equations</li> <li>• Representation of mathematical sentences for symbols.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Contrasting</b> terms and constants.</li> <li>• <b>Substitution</b> or <b>representation</b> of letters for numbers.</li> <li>• <b>Construction</b> of equations.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Accuracy</b> in computation of values.</li> <li>• <b>Logical thinking</b> in factoring.</li> <li>• <b>Abstract reasoning</b> in constructing formulae.</li> </ul>
	<b>8.5.2 Substitutions</b>	8.5.2.1 Evaluate algebraic expressions.			
	<b>8.5.3 Simple Linear equations.</b>	8.5.3.1 Solve simple equations using the additive and multiplicative inverse.			
	<b>8.5.4 Construction of formulae.</b>	8.5.4.1 Construct formula from given statement.			

TOPIC/ THEME	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
<b>8.6 SOCIAL &amp; COMMERCIAL ARITHMETIC</b>	<b>8.6.1 Simple and compound interest.</b>	8.6.1.1 Calculate simple and compound interest.	<ul style="list-style-type: none"> <li>Calculating compound and simple interest.</li> </ul>	<ul style="list-style-type: none"> <li><b>Entrepreneurship</b> using simple and compound interest</li> </ul>	<ul style="list-style-type: none"> <li><b>Appreciation</b> of compound interest, insurance and assurance.</li> </ul>
	<b>8.6.2 Utility bills, Bank and Post Office charges.</b>	8.6.2.1 Calculate utility bills, Bank and Postal charges.	<ul style="list-style-type: none"> <li>Loan repayments.</li> <li>Prepare simple budgets.</li> </ul>	<ul style="list-style-type: none"> <li><b>Generating</b> budgets.</li> </ul>	<ul style="list-style-type: none"> <li><b>Team work.</b></li> </ul>
	<b>8.6.3 Budgeting.</b>	8.6.3.1 Generate simple budget.	<ul style="list-style-type: none"> <li>Calculating the value of property Insured (e.g. Car, building, household), premiums, Insurance cover, Life assurance (Accident, medical, education), policy cover.</li> </ul>	<ul style="list-style-type: none"> <li><b>Calculation</b> involving premium and policy cover.</li> </ul>	<ul style="list-style-type: none"> <li><b>Accuracy</b> in calculating utility bills, bank and postal charges.</li> </ul>
	<b>8.6.4 Insurance and Assurance.</b>	8.6.4.1 Calculate insurance, premium, policy cover.	<ul style="list-style-type: none"> <li><b>Interpretation</b> of bills.</li> </ul>	<ul style="list-style-type: none"> <li><b>Planning</b> and costing of goods bought on hire purchase.</li> </ul>	<ul style="list-style-type: none"> <li><b>Curiosity</b> in hire purchase.</li> </ul>
	<b>8.6.5 Hire purchase.</b>	8.6.5.1 Calculate cost of goods bought on hire purchase.	<ul style="list-style-type: none"> <li>Calculating the initial cost, instalments, interest, discount and total cost of goods bought on hire purchase.</li> </ul>		



TOPIC/ THEME	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
8.7 CARTESIAN PLANE	8.7.1 The Cartesian Graph	8.7.1.1 Draw the XOY plane. 8.7.1.2 Plot and read the ordered pair (x, y) on the XOY plane. 8.7.1.3 Join different points on the Cartesian plane.	<ul style="list-style-type: none"> <li>• The Cartesian plane.</li> <li>• Drawing the XOY plane.</li> <li>• Plotting ordered pairs.</li> <li>• Drawing shapes by joining ordered pairs.</li> <li>• Drawing straight line graphs (e.g. <math>y = x</math>, <math>x = 4</math>, <math>y = 3</math>).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Identification</b> of the X and Y plane.</li> <li>• <b>Reading</b> and plotting of coordinates.</li> <li>• Drawing of straight lines using on the XOY plane.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Curiosity in</b> plotting points on XOY plane</li> <li>• Accuracy in plotting point on the XOY plane.</li> </ul>
	8.7.2 Equation of straight line	8.7.2.1 Graph straight lines.			
8.8 FUNCTIONS	8.8.1 Relations	8.8.1.1 Describe different types of relationships.	<ul style="list-style-type: none"> <li>• Types of relationships (one to one, one to many, many to one many to many).</li> <li>• Mappings (one to one, many to one).</li> <li>• Representation of a function <math>[f: x \rightarrow a; f(x) = a]</math>.</li> <li>• Making arrow diagrams to show relations and mappings for domain and range.</li> <li>• Ordered pairs as object and image.</li> <li>• Real life functional problems.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Identification</b> range and domain.</li> <li>• <b>Matching</b> relations.</li> <li>• <b>Interpretation</b> of functions.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Curiosity</b> in drawing of graphs of linear equations.</li> <li>• <b>Logical thinking</b> in finding range and domain of functions.</li> </ul>
	8.8.2 Mappings	8.8.2.1 Map functions to show relationship. 8.8.2.2 Identify mappings from arrow diagrams. 8.8.2.3 Find the range of the function when domain is given.			
	8.8.3 Set of ordered pairs	8.8.3.1 Find a function given a set of ordered pairs.			
	8.8.4 Linear graphs	8.8.4.1 Draw graphs of linear functions. 8.8.4.2 Solve problems involving functions.			

TOPIC/ THEME	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
8.9 SOLID SHAPES	8.9.1 Three dimensional shapes.	8.9.1.1 Identify cones and pyramids. 8.9.1.2 Draw nets of cones and pyramids. 8.9.1.3 Draw/sketch of cones and pyramids.	<ul style="list-style-type: none"> <li>Identifying and draw cones and pyramids.</li> <li>Drawing nets of cones and pyramids.</li> <li>Drawing/sketching of cones and pyramids.</li> </ul>	<ul style="list-style-type: none"> <li><b>Identification</b> of cones and pyramids.</li> <li><b>Comparison</b> of nets of cones and pyramids.</li> <li><b>Interpretation</b> of nets of cones and pyramids.</li> <li>Application</li> </ul>	<ul style="list-style-type: none"> <li><b>Creativity</b> in drawing nets of cones and pyramids.</li> <li><b>Appreciation</b> of drawing cones and pyramids.</li> <li><b>Accuracy</b> in finding point symmetry and centre of rotation.</li> </ul>
8.10 MENSURATION	8.10.1 Area.  8.10.2 Volume.  8.10.3 Density.	8.10.1.1 Find the total surface area of cylinder and triangular prism. 8.10.2.1 Calculate the volume of cylinder and triangular prism. 8.10.3.1 Describe density. 8.10.3.2 Calculate density of regular objects.	<ul style="list-style-type: none"> <li>Finding the total surface area of a cylinder and triangular prism.</li> <li>Finding volume of cylinder and triangular prism.</li> <li>Calculating density of regular objects.</li> </ul>	<ul style="list-style-type: none"> <li><b>Calculation</b> of surface area and volume of a cylinder and triangular prism.</li> <li><b>Interpretation</b> of density of regular objects.</li> </ul>	<ul style="list-style-type: none"> <li><b>Accuracy</b> in calculations involving surface area and volume.</li> <li><b>Appreciation</b> of density of objects.</li> </ul>

TOPIC/ THEME	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
8.11 ANGLES	8.11.1 Related angles. 8.11.2 Angle associated with straight lines.	8.11.1.1 Identify related angles. 8.11.2.1 Find angles associated with straight lines. 8.11.2.2 Find angles of elevation and depression. 8.11.2.3 Solve problems related to real life.	<ul style="list-style-type: none"> <li>• Complementary and supplementary angles.</li> <li>• Transversal and parallel lines.</li> <li>• Corresponding angles, vertically opposite angles, alternate angles, allied angles, angles at a point.</li> <li>• Angles of elevation and depression.</li> <li>• Angle properties of a triangle.</li> <li>• Interior and exterior angles.</li> <li>• Application of angles.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Identification</b> of related angles and angles of elevation and depression.</li> <li>• <b>Interpretation</b> of different types of angles.</li> <li>• <b>Computation</b> of related angles.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Curiosity</b> in finding related angles.</li> </ul>

TOPIC/ THEME	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
<b>8.12 GEOMETRICAL CONSTRUCTION</b>	<b>8.12.1 Construction of Angles.</b>	8.12.1.1 Construct $60^\circ$ , $90^\circ$ angles using ruler and compass.	<ul style="list-style-type: none"> <li>Using a ruler and compass.</li> <li>Constructing <math>60^\circ</math>, <math>90^\circ</math> angles using ruler and pair of compass.</li> <li>Bisecting angles (giving rise to other angles; <math>45^\circ</math>, <math>30^\circ</math>, <math>15^\circ</math>, <math>75^\circ</math>).</li> <li>Constructing perpendiculars (to a given line, perpendicular bisector and from given point) and parallel lines without using set squares.</li> <li>Relating geometrical construction to real life problems (floor plan of buildings) .</li> </ul>	<ul style="list-style-type: none"> <li><b>Construction</b> of <math>60^\circ</math>, <math>90^\circ</math> angles, parallel lines, perpendicular lines.</li> <li><b>Bisecting</b> angles.</li> <li><b>Dividing</b> lines</li> <li><b>Application</b> of construction in real life problems.</li> </ul>	<ul style="list-style-type: none"> <li><b>Accuracy</b> in construction of angles.</li> <li><b>Creativity</b> and Logical thinking in constructing angles, parallel lines and perpendicular bisectors.</li> <li><b>Neatness</b> when constructing.</li> </ul>
		8.12.1.2 Construct angle Bisectors using ruler and compass.			
	<b>8.12.2 Construction of lines.</b>	8.12.2.1 Use ruler and compass to construct parallel lines.			
		8.12.2.2 Construct perpendiculars using ruler and compass.			
		8.12.2.3 Relate geometrical construction to real life problems.			

TOPIC/ THEME	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
8.13 STATISTICS	8.13.1 Methods of Data Collection.	8.13.1.1 Identify methods of data collection.	<ul style="list-style-type: none"> <li>• Data collection instruments (questionnaire, interviews, observation).</li> <li>• Frequency tables.</li> <li>• Graphing (Histograms and frequency polygons).</li> <li>• Statistical presentations.</li> <li>• Central tendency (Mean, Mode, Median, Modal class) as representative values.</li> <li>• Constructing and interpreting graphs of given data (i.e. Line graph, Pie chart, Compound bar chart).</li> <li>• Uses of statistics in real life.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Presentation</b> of ungrouped and grouped data in statistical graphs.</li> <li>• <b>Interpretation</b> of statistical graphs.</li> <li>• <b>Computation</b> of measures of central tendency.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Curiosity</b> of representation of collected data.</li> <li>• <b>Accuracy</b> in computation of measures of central tendency.</li> </ul>
	8.13.2 Data presentations.	8.13.2.1 Present data on Histograms and frequency polygons. 8.13.2.2 Draw frequency tables of grouped data. 8.13.2.3 Construct and interpret graphs of given data.			
	8.13.3 Measures of central tendency.	8.13.3.1 Find Mean for grouped and ungrouped data.			
	8.13.4 Application.	8.13.4.1 Identify uses of statistics.			

TOPIC/ THEME	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
<b>8.14 NUMBER BASES</b>	<b>8.14.1 Conversions of number bases.</b>	8.14.1.1 Convert from denary to bicimal numbers of the form 1110.1, up to 3 'bicimal places.	<ul style="list-style-type: none"> <li>• Conversion from denary to bicimal numbers of the form 1110.1, up to 3 'bicimal places' and vice versa.</li> <li>• Conversion of bicimal numbers to base 10.</li> <li>• Multiplication and division in base 2 and base 5.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Conversions</b> of number bases to other bases.</li> <li>• <b>Multiplication</b> and Division of number bases.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Accuracy</b> in conversions of number bases.</li> <li>• Appreciation of bicimal numbers.</li> </ul>
	<b>8.14.2 Multiplication and Division.</b>	8.14.1.2 Convert number in bicimal to base 10. 8.14.2.1 Multiply and Divide numbers in base 2 and base 5.			
<b>8.15 COMPUTERS</b>	<b>8.15.1 Introduction to computers.</b>	8.15.1.1 Describe computer processes.	<ul style="list-style-type: none"> <li>• Defining the computer process (Input, Process, and Output).</li> <li>• Construction of: Flow charts and decision boxes.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Designing</b> flow charts.</li> <li>• <b>Sequencing</b> of computational stages.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Curiosity</b> in defining computer processes.</li> <li>• <b>Logical thinking</b> in constructing flow charts.</li> </ul>
	<b>8.15.2 Flow charts.</b>	8.15.2.1 Construct flow charts.			

## GRADE 9

General Outcomes	Key Competences
<ul style="list-style-type: none"> <li>▪ Provide clear mathematical <b>thinking</b> and expression in the learner.</li> <li>▪ Develop the learners' mathematical and ICT <b>knowledge and skills</b>.</li> <li>▪ Enrich the learners' <b>understanding</b> of mathematical concepts in order to facilitate further study of the discipline.</li> <li>▪ Build up an appreciation of mathematical and ICT concepts so that the learner can <b>apply</b> these for problem solving in everyday life.</li> <li>▪ Enable the learner <b>represent</b> , interpret and use data in a variety of forms.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Think mathematically and accurately in problem solving skills and apply these skills to formulate and solve mathematical and other related problems.</li> <li>▪ Develop necessary skills needed to apply mathematical and ICT concepts and skills in other disciplines.</li> <li>▪ Develop abilities and ideas drawn from mathematics to reason logically, communicate mathematically and technologically, and learn independently without too much supervision (self-discipline).</li> <li>▪ Development positive attitudes towards mathematics and use it in other subjects such as science and technology.</li> <li>▪ Apply mathematical tools such as information and communication technology in the learning of other subjects.</li> <li>▪ Use mathematics for enjoyment and pleasure.</li> <li>▪ Develop understanding of algebra, geometry, measurements and shapes.</li> </ul>

TOPIC	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
9.1 SQUARE ROOTS AND CUBE ROOTS	9.1.1 Square Roots	9.1.1.1 Describe the meaning of square root and its symbol.	<ul style="list-style-type: none"> <li>Describing square root and cube root and the symbols (<math>\sqrt{\quad}</math> and <math>\sqrt[3]{\quad}</math>).</li> <li>Square and cubes numbers (ONLY PERFECT SQUARES AND CUBES AT THIS LEVEL).</li> </ul>	<ul style="list-style-type: none"> <li><b>Interpretation</b> of root symbol.</li> <li><b>Evaluation</b> of square roots and cube roots.</li> </ul>	<ul style="list-style-type: none"> <li><b>Awareness</b> of root and its symbol.</li> <li><b>Curiosity</b> in using root symbol.</li> </ul>
	9.1.2 Cube Roots	9.1.2.1 Describe the meaning of cube root and its symbol.			
	9.1.3 Roots of Squares and Cubes	9.1.3.1 Find roots of squares and cubes .			
9.2 INDEX NOTATION	9.2.1 Indices	9.2.1.1 Interpret the positive and zero indices.	<ul style="list-style-type: none"> <li>Interpreting positive and Zero indices (<math>5^0 = 1</math>).</li> <li>Laws of indices (addition and subtraction of powers).</li> </ul>	<ul style="list-style-type: none"> <li><b>Interpretation</b> of the meaning of zero and positive indices.</li> <li><b>Computation</b> of numbers in index notation.</li> </ul>	<ul style="list-style-type: none"> <li><b>Awareness</b> of zero and positive indices.</li> </ul>
	9.2.2 Laws of Indices	9.2.2.1 Apply the laws of indices.			
9.3 REAL NUMBERS	9.3.1 Rational Numbers	9.3.1.1 Identify rational numbers .	<ul style="list-style-type: none"> <li>Identifying rational numbers as numbers of the form <math>\frac{a}{b}</math> (<math>b \neq 0</math>).</li> <li>Irrational numbers such as <math>\pi, \sqrt{3}</math>.</li> </ul>	<ul style="list-style-type: none"> <li><b>Relating</b> rational numbers to irrational numbers.</li> <li><b>Estimation</b> of irrational numbers.</li> </ul>	<ul style="list-style-type: none"> <li><b>Awareness</b> of rational and irrational numbers.</li> </ul>
	9.3.2 Irrational Numbers	9.3.2.1 Identify irrational numbers.			
9.4 PYTHAGORAS' THEOREM	9.4.1 Right Angled Triangle	9.4.1.1 Identify sides in the right angled triangle.	<ul style="list-style-type: none"> <li>Background to Pythagoras' theorem</li> <li>Sides in the right angled triangle (i.e. two adjacent sides and hypotenuse)</li> <li>Area of squares (i.e. <math>a^2 + b^2 = c^2</math>).</li> <li>Using Pythagoras' theorem to solve problems in real life</li> </ul>	<ul style="list-style-type: none"> <li><b>Identification</b> of sides in a right angles triangle.</li> <li><b>Application</b> of the Pythagoras' theorem.</li> </ul>	<ul style="list-style-type: none"> <li><b>Curiosity</b> in use of Pythagoras theorem.</li> <li><b>Awareness</b> of the Pythagoras theorem.</li> </ul>
	9.4.2 Application	9.4.2.1 Solve real life problems involving Pythagoras' theorem.			



TOPIC	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
<b>9.5 DIRECTIONS AND BEARINGS</b>	<b>9.5.1 Directions</b>	9.5.1.1 Identify the cardinal points on the compass.	<ul style="list-style-type: none"> <li>• Points on the Compass (N, E, W and S).</li> <li>• Using North and South points to find compass bearings (N650E or N750W).</li> <li>• Presentation of three figure bearing of one point from another (060°).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Identification</b> of cardinal points on the compass.</li> <li>• <b>Interpretation</b> of the three figure bearings.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Awareness</b> of direction and bearings.</li> <li>• <b>Curiosity</b> in use of compass bearings.</li> </ul>
	<b>9.5.2 Bearings</b>	9.5.2.1 Find three figure bearings of one point from another.			
<b>9.6 EQUATIONS AND INEQUATIONS</b>	<b>9.6.1 Subject of formula</b>	9.6.1.1 Change subject of the formula.	<ul style="list-style-type: none"> <li>• Subject of the formula.</li> <li>• Equations and inequations ( in one and two variables) include those with fractions.</li> <li>• Graphs of Inequations (shade the wanted region).</li> <li>• Solutions of Simultaneous linear equations ( elimination, substitution and graphical methods).</li> <li>• Application.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Representation</b> of subject of formula in one and two variables.</li> <li>• <b>Application</b> of change of subject of formula to linear equations and inequations in two variables.</li> <li>• <b>Interpretation</b> of the shading of the wanted region.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Curiosity</b> in solving linear equations and inequations.</li> <li>• <b>Decisiveness</b> in choosing the right subject of formula when solving simultaneous linear equations in two variables.</li> </ul>
	<b>9.6.2 Equations and inequations</b>	9.6.2.1 Solve equations and inequations in one variable.			
		9.6.2.2 Solve equations and Inequations in two variables.			
		9.6.2.3 Sketch the graph of Inequations and shade the wanted region.			
	<b>9.6.3 Systems of Linear equations</b>	9.6.3.1 Solve simultaneous linear equations in two variables.			
	<b>9.6.4 Application of equations and Inequations</b>	9.6.4.1 Apply equations and inequations in real life.			

TOPIC	SUB-TOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
<b>9.7 SOCIAL &amp; COMMERCIAL ARITHMETIC</b>	<b>9.7.1 Salaries and Wages.</b>	9.7.1.1 Work out payments for piece work & work per hour.	<ul style="list-style-type: none"> <li>• Salary from wages.</li> <li>• Payslips and wage sheets.</li> <li>• Salaries deductions.</li> <li>• Over time, commission, bonus.</li> <li>• Income tax and value added tax (VAT) .</li> <li>• Pension and compensation.</li> <li>• Depreciation and appreciation.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Computation</b> of Salary and wages.</li> <li>• <b>Problem solving</b> involving pension and social schemes.</li> <li>• <b>Decision making</b> in depreciation and appreciation.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Awareness</b> of taxes, salaries and social schemes.</li> <li>• <b>Appreciation</b> of taxes and social schemes.</li> </ul>
	<b>9.7.2 Taxes.</b> <b>9.7.3 Pension and Social Schemes.</b> <b>9.7.4 Investments.</b>	9.7.1.2 Compute deduction from salaries. 9.7.1.3 Calculate over time. 9.7.2.1 Differentiate & calculate income tax and value added tax. 9.7.3.1 Calculate pension and compensation. 9.7.4.1 Calculate depreciation and appreciation.			
<b>9.8 MATRICES</b>	<b>9.8.1 Introduction to Matrices</b>	9.8.1.1 Present data from real life in matrix form.	<ul style="list-style-type: none"> <li>• Meaning of matrices</li> <li>• Order of matrices.</li> <li>• Adding and subtracting matrices.</li> <li>• Multiplying a matrix by a scalar.</li> <li>• Multiplication of matrices (up to 2x2 matrices).</li> <li>• Matrices in real life.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Interpretation</b> of order of matrices.</li> <li>• <b>Presentation</b> of matrices.</li> <li>• <b>Record keeping</b> using matrices.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Awareness</b> of matrices.</li> <li>• <b>Orderliness</b> in writing columns and row of matrices.</li> </ul>
	<b>9.8.2 Order of Matrices</b> <b>9.8.3 Operations on Matrices</b> <b>9.8.4 Application of Matrices</b>	9.8.2.1 State order of matrices. 9.8.3.1 Add and subtract matrices. 9.8.3.2 Multiply a matrix by a scalar. 9.8.3.3 Multiply matrices 9.8.4.1 Apply matrices in real life.			

TOPIC	SUBTOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
9.9 MENSURATION	9.9.1 Regular polygons.	9.9.1.1 Describe properties of interior & exterior angles of regular polygons 9.9.1.2 Calculate Interior and exterior angles of regular polygons.	<ul style="list-style-type: none"> <li>Interior and exterior angles of regular polygons.</li> <li>Sum of interior angles of regular polygons.</li> <li>Irregular polygons.</li> </ul>	<ul style="list-style-type: none"> <li><b>Identification</b> of regular polygons.</li> <li><b>Computation</b> of interior and exterior of regular polygons.</li> </ul>	<ul style="list-style-type: none"> <li><b>Accuracy</b> in calculating interior and exterior angles.</li> </ul>
	9.9.2 Irregular polygons.	9.9.2.1 Describe irregular polygons.			
9.10 SIMILARITY & CONGRUENCY	9.10.1 Similar figures.	9.10.1.1 Illustrate properties of different figures in order to determine similarity. 9.10.1.2 Establish conditions of similarity. 9.10.1.3 Solve problems involving similarity.	<ul style="list-style-type: none"> <li>Properties determining similarity.</li> <li>Properties determining congruency.</li> <li>Calculations relating to application of similarity and congruency in real life.</li> <li>Ratio properties.</li> </ul>	<ul style="list-style-type: none"> <li><b>Comparison</b> of similar shapes.</li> <li><b>Interpretation</b> of congruency and similarities in figures.</li> <li><b>Drawing</b> similar and congruent figures.</li> </ul>	<ul style="list-style-type: none"> <li><b>Awareness</b> of similar and congruent shapes.</li> <li><b>Logical thinking</b> in determining similarities and congruency of figures.</li> </ul>
	9.10.2 Congruent figures.	9.10.2.1 Illustrate properties of different figures in order to determine congruency. 9.10.2.2 Establish conditions of congruency. 9.10.2.3 Solve problems involving congruency. 9.10.2.4 Use similarity and congruency to solve problems in real life.			

TOPIC	SUBTOPICS	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILLS	VALUES
<b>9.11 GEOMETRICAL CONSTRUCTION</b>	<b>9.11.1 Circum-circles and Inscribed circles</b>	9.11.1.1 Construct triangles, circum-circles and inscribed circles.	<ul style="list-style-type: none"> <li>• Use of mathematical instruments.</li> <li>• Constructing triangles, circum-circles and inscribed circles.</li> <li>• Designing patterns (derived from construction).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Construction</b> of triangles, circum-circles and inscribed circles.</li> <li>• <b>Designing</b> of different patterns.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Accuracy</b> in measurements involved.</li> <li>• <b>Neatness</b> in constructions.</li> <li>• <b>Curiosity</b> in designing patterns.</li> </ul>
	<b>9.11.2 Application of Geometrical Constructions</b>	9.11.2.1 Design patterns.			
<b>9.12 PROBABILITY</b>	<b>9.12.1 Introduction to probability</b>	9.12.1.1 Describe the meaning and importance of probability	<ul style="list-style-type: none"> <li>• Meaning and importance of probability - Chances in coins, playing cards and dice.</li> <li>• Terms related to probability (occurrence, favourable outcome, possible outcome, certainty and impossibility).</li> <li>• Complement of probability.</li> <li>• Probability values.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Demonstration</b> of experiments in probability.</li> <li>• <b>Interpretation</b> of probability and chance.</li> <li>• <b>Observation</b> of probability experiments.</li> <li>• <b>Interpretation</b> of probability values.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Curiosity</b> in probability experiments.</li> <li>• <b>Logical thinking</b> in interpreting probability values.</li> <li>• <b>Team work</b> when carrying out experiments and recording of results.</li> </ul>
	<b>9.12.2 Experimental Probability</b>	9.12.2.1 Determine outcomes of an experiment.			
	<b>9.12.3 Theoretical probability</b>	9.12.3.1 Demonstrate favourable and possible outcomes. 9.12.3.2 Interpret probability values.			
<b>9.13 COMPUTER</b>	<b>9.13.1 Decision boxes</b>	9.13.1.1 Construct decision boxes.	<ul style="list-style-type: none"> <li>• Sequencing activities.</li> <li>• Basic Programming (writing simple computer programmes).</li> <li>• Using simple programs to calculate area, volume, averages and linear equations.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Designing</b> of decision flow charts.</li> <li>• <b>Application</b> of flow charts to real life.</li> <li>• <b>Analysis</b> of decisions.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Curiosity</b> in use of flow charts.</li> <li>• <b>Logical thinking</b> in constructing flow charts.</li> <li>• Reasoning in writing simple computer programs.</li> </ul>
	<b>9.13.2 Loops</b>	9.13.2.1 Identify and create loops in flow charts.			
	<b>9.13.3 Simple programs</b>	9.13.3.1 Write simple computer programmes. 9.13.3.2 Use simple programmes to calculate area, volume, find averages and resolve linear equation.			

## APPENDIX 1: GRADE 8 AND 9 SEQUENCE

DOMAIN	TOPIC	SPECIFIC OUTCOMES	
		GRADE 8	GRADE 9
Algebra	SETS	8.1.1.2 Interpret the set builder notation; $\{x: x > 2, x \in \mathbb{Z}\}$ .	
		8.1.2.2 Find the intersection set involving up to 3 sets.	
		8.1.3.2 Interpret the set complement including its symbol (i.e. $A'$ , $B'$ )	
		8.1.4.3 Use single set operation symbols (e.g. $A \cup B \cup C$ or $A \cap B \cap C$ ).	
		8.1.4.4 Use combined set operation symbols [e.g. $(A \cup B') \cap C$ , $(A' \cap B) \cup C$ , $A' \cap (B' \cup C)$ ]	
		8.1.5.1 Apply simple operations on sets	
	ALGEBRAIC EXPRESSIONS & FORMULA	8.5.1.1 Formulate algebraic expressions	
		8.5.1.2 Simplify algebraic expressions	
		8.5.1.3 Apply the distributive law in simplifying algebraic expressions	
		8.5.2.1 Evaluate algebraic expressions	
		8.5.3.1 Solve simple equations using the additive and multiplicative inverse	
	EQUATIONS AND INEQUALITIES	8.5.4.1 Construct formula from given statement.	9.6.1.1 Change subject of the formula 9.6.2.1 Solve equations and inequations in one variable 9.6.2.2 Solve equations and Inequations in two variables 9.6.2.3 Sketch the graph of Inequations and shade the wanted region 9.6.3.1 Solve simultaneous linear equations in two variables 9.6.4.1 Apply equations and inequations in real life

DOMAIN	TOPIC	SPECIFIC OUTCOMES	
		GRADE 8	GRADE 9
	MATRICES		9.8.1.1 Present data from real life in matrix form. 9.8.2.1 State order of matrices 9.8.3.1 Add and subtract matrices 9.8.3.2 Multiply a matrix by a scalar 9.8.3.3 Multiply matrices 9.8.4.1 Apply matrices in real life
<b>Numbers &amp; Calculation</b>	SQUARE ROOTS AND CUBE ROOTS		9.1.1.1 Describe the meaning of square root and its symbol 9.1.2.1 Describe the meaning of cube root and its symbol 9.1.3.1 Find roots of Squares and Cubes
	INTEGERS	8.2.1.1 Add and subtract integers without using the number line. 8.2.1.2 Multiply and divide integers.	
	INDEX NOTATION		9.2.1.1 Interpret the positive and zero indices. 9.2.2.1 Apply the laws of indices
	REAL NUMBERS		9.3.1.1 Identify Rational numbers 9.3.2.1 Identify Irrational numbers
	SOCIAL & COMMERCIAL ARITHMETIC	8.6.1.1 Calculate simple and compound interest 8.6.2.1 Calculate utility bills, Bank and Postal charges. 8.6.3.1 Generate simple budget 8.6.4.1 Calculate Insurance, premium, policy cover 8.6.5.1 Calculate cost of goods bought on hire purchase	9.7.1.1 Work out payments for piece work & work per hour 9.7.1.2 Compute deduction from salaries 9.7.1.3 Calculate over time 9.7.2.1 Differentiate & calculate income tax and value added tax 9.7.3.1 Calculate pension and compensation 9.7.4.1 Calculate depreciation and appreciation
	NUMBER BASES	8.14.1.1 Convert from denary to bicimal numbers of the form 1110.1, up to 3 'bicimal places. 8.14.1.2 Convert number in bicimal to base 10 8.14.2.1 Multiply and Divide numbers in base 2 and base 5.	

DOMAIN	TOPIC	SPECIFIC OUTCOMES	
		GRADE 8	GRADE 9
<b>Measures</b>	<b>APPROXIMATION &amp; ESTIMATION</b>	8.3.1.1 Express numbers to given significant figure. 8.3.1.2 Estimate measures or quantities 8.3.1.3 Round-off numbers to specified degree of accuracy. 8.3.2.1 Express numbers in scientific notation or standard form. 8.3.2.2 Approximate numbers in scientific notation to given degree of accuracy 8.1.1.1 Apply the concept of approximation in real life	
	<b>MENSURATION</b>	8.10.1.1 Find the total surface area of cylinder and triangular prism 8.10.2.1 Calculate the volume of cylinder and triangular prism 8.10.3.1 Describe density 8.10.3.2 Calculate density of regular objects	9.9.1.1 Describe properties of interior & exterior angles of regular polygons 9.9.1.2 Calculate Interior and exterior angles of regular polygons. 9.9.2.1 Describe irregular polygons
<b>Geometry</b>	<b>PYTHAGORAS' THEOREM</b>		9.4.1.1 Identify sides in the Right angled triangle 9.4.1.2 State the Pythagoras' theorem 9.4.2.1 Solve real life problems involving Pythagoras' theorem
	<b>DIRECTIONS AND BEARINGS</b>		9.5.1.1 Identify the cardinal points on the compass 9.5.2.1 Find three figure bearings of one point from another
	<b>CARTESIAN PLANE</b>	8.7.1.1 Draw the XOY plane 8.7.1.2 Plot and read the ordered pair (x, y) on the XOY plane 8.7.1.3 Join different points on the Cartesian plane 8.7.2.1 Graph straight lines	
	<b>SOLID SHAPES</b>	8.9.1.1 Identify cones and pyramids 8.9.1.2 Draw nets of cones and pyramids 8.9.1.3 Draw/sketch of cones and pyramids	

DOMAIN	TOPIC	SPECIFIC OUTCOMES	
		GRADE 8	GRADE 9
	<b>SIMILARITY &amp; CONGRUENCY</b>		9.10.1.1 Illustrate properties of different figures in order to determine similarity 9.10.1.2 Establish conditions of similarity. 9.10.1.3 Solve problems involving similarity. 9.10.2.1 Illustrate properties of different figures in order to determine congruency 9.10.2.2 Establish conditions of congruency 9.10.2.3 Solve problems involving congruency. 9.10.2.4 Use similarity and congruency to solve problems in real life
	<b>ANGLES</b>	8.10.1.1 Identify related angles 8.11.2.1 Find angles associated with straight lines 8.11.2.2 Find angles of elevation and depression 8.11.2.3 Solve problems related to real life	
	<b>GEOMETRICAL CONSTRUCTION</b>	8.12.1.1 Construct $60^{\circ}$ , $90^{\circ}$ angles using ruler and compass 8.12.1.2 Construct angle Bisectors using ruler and compass 8.12.2.1 Use ruler and compass to construct parallel lines 8.12.2.2 Construct perpendiculars using ruler and compass 8.12.2.3 Relate geometrical construction to real life problems	9.11.1.1 Construct triangles, circum- circles and inscribed circles 9.11.2.1 Design patterns
<b>Relations</b>	<b>FUNCTIONS</b>	8.8.1.1 Describe different types of relationships 8.8.2.1 Map functions to show relationship 8.8.2.2 Identify mappings from arrow diagrams. 8.8.2.3 Find the range of the function when domain is given 8.8.3.1 Find a function given a set of ordered pairs. 8.8.4.1 Draw graphs of linear functions 8.8.4.2 Solve problems involving functions	
	<b>RATIO &amp; ROPORTION</b>	8.4.1.1 Solve problems that involve ratio and proportion	



DOMAIN	TOPIC	SPECIFIC OUTCOMES	
		GRADE 8	GRADE 9
<b>Probability &amp; Statistics</b>	PROBABILITY		9.12.1.1 Describe the meaning and importance of probability 9.12.2.1 Determine outcomes of an experiment. 9.12.3.1 Demonstrate favourable and possible outcomes 9.12.3.2 Interpret probability values.
	STATISTICS	8.13.1.1 Identify methods of data collection 8.13.2.1 Present data on Histograms and frequency polygons 8.13.2.2 Draw frequency tables of grouped data 8.13.2.3 Construct and interpret graphs of given data 8.13.3.1 Find Mean for grouped and ungrouped data 8.13.4.1 Identify uses of statistics	
<b>Computer</b>	COMPUTERS	8.15.1.1 Describe computer processes 8.15.2.1 Construct flow charts	9.13.1.1 Construct decision boxes 9.13.2.1 Identify and create loops in flow charts 9.13.3.1 Write simple computer programmes 9.13.3.2 Use simple programmes to calculate area, volume, find averages and resolve linear equation





