ISBN: 978-9982-54-056-8

Printed by
Zambia Educational Publishing House

Republic of Zambia

Ministry of Education

MATHEMATICS I SYLLABUS

SECONDARY EDUCATION ORDINARY LEVEL
FORM 1 - 4

DEVELOPED BY THE CURRICULUM DEVELOPMENT CENTRE
LUSAKA
2024

Republic of Zambia

MINISTRY OF EDUCATION

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ISBN: 978-9982-00-942-7

First Published 2024 by
Zambia Educational Publishing House
Light Industrial Area
Chishango Road
P. O. Box 32708
Lusaka, Zambia

Printed by:
Zambia Educational Publishing House (ZEPH)

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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

PREFACE

The **Ordinary Level Mathematics I Syllabus** is a comprehensive framework designed to equip learners with the foundational Mathematical competences necessary for their academic journey and beyond. The syllabus is crafted with a firm commitment to competence-based education, recognizing the importance of not just acquiring knowledge, but rather the development of critical and analytical thinking, problem-solving skills and conceptual understanding.

In today's rapidly evolving world, Mathematical proficiency is an indispensable asset, enabling individuals to navigate various challenges and opportunities with confidence and dexterity. Therefore, this syllabus is meticulously structured to foster the holistic growth of learners, empowering them to engage meaningfully with Mathematical concepts, apply them in real-world scenarios, and cultivate a lifelong appreciation for the beauty and utility of mathematics.

At the heart of this syllabus, lies the principle of competence-based learning, which prioritizes the mastery of essential skills and concepts over mere coverage of content. Emphasis is placed on developing not only computational skills but also on nurturing Mathematical reasoning, communication, and problem-solving abilities.

Furthermore, this syllabus is designed to be flexible and adaptable, recognizing the diverse learning needs and backgrounds of learners. Teachers are encouraged to employ a variety of instructional strategies, resources and assessment methods to cater for the individual strengths and challenges of their learners, thereby fostering a supportive and inclusive learning environment.

As educators, we play a pivotal role in shaping the mathematical literacy and confidence of future generations. With the implementation of this competence-based Ordinary Level Mathematics I Syllabus , we embark on a collective endeavour to inspire curiosity, ignite passion, and unlock the full potential of every young Mathematician.

It is our sincere hope that this resource will serve as a guiding light, illuminating the path towards mathematical excellence and empowerment for all learners.

Together, let us embark on this transformative journey towards a future where every child embraces Mathematics with enthusiasm, resilience and mastery.

Joel Kamoko (Mr.)
The Permanent Secretary- Educational Services
MINISTRY OF EDUCATION

ACKNOWLEDGEMENT

This syllabus is designed to provide topics for Mathematics considered necessary to be offered at the Secondary School level. This is with a view to provide guidance for the teaching and learning of this unique, but yet exciting blend of concepts from mathematics for teachers and other experts in the field to appropriately offer relevant lessons at this level.

Many thanks go to individuals, institutions and organizations that provided the technical and financial input to the successful development of this syllabus. These include; the Directorates of Secondary Education, Teacher Education and Specialized Services, National Science Centre and the Examinations Council of Zambia, subject teachers from schools, lecturers from colleges and universities in Zambia.

We pay special tribute to co-operating partners, especially British Council and UNESCO for rendering financial and technical support during the finalisation of the syllabus.

Last but not least, I recognize the commitment and hard work of all the staff at the Curriculum Development Centre (CDC) in ensuring that this syllabus comes to reality.

Charles Ndakala, (Dr.)
Director – Curriculum Development
MINISTRY OF EDUCATION

INTRODUCTION

This syllabus is committed to providing an enriching and supportive educational environment where learners can develop a lifelong interest for Mathematics. By promoting inquiry, curiosity, and a passion for Mathematics, we aim to prepare learners not only for academic success but also for their future roles as informed and responsible citizens in a scientifically advanced society.

We are confident that this Mathematics syllabus will inspire and empower learners to achieve their full potential, equipping them with the knowledge and skills necessary to navigate and contribute to the world around them. This syllabus is designed to ensure learners develop a deep understanding of Mathematical concepts while also acquiring practical skills and competencies needed for further education and careers in Mathematics.

The Form 1-4 Ordinary Mathematics I syllabus is designed to provide you with a comprehensive overview and understanding of fundamental Mathematical concepts based on their interconnectedness. The 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 Early Childhood to tertiary education.

Some topics have been revised to suit the 21st Century learners to help them gain competencies that they can utilize in life beyond school. A wide range of concepts including Numbers, Algebra, Measures, Geometry, Relations & Functions, Trigonometry, Statistics & Probability among others have been included in this syllabus.

Rationale

The rationale for teaching Ordinary Mathematics lies in the fundamental role that Mathematics plays in shaping the way we understand the world around us. Here are some key points that highlight the rationale for teaching Ordinary Mathematics:

1. Basic Skill Development: Ordinary Mathematics provides learners with essential skills and knowledge in numeracy, problem-solving, critical thinking, and logical reasoning. These skills are crucial for success in various academic disciplines, careers, and everyday life
2. Foundation for Advanced Studies: Ordinary Mathematics serves as a foundation for more advanced Mathematical studies in disciplines such as calculus, algebra, geometry, statistics, and trigonometry. A solid understanding of basic Mathematical concepts is necessary for pursuing higher-level Mathematics courses.
3. Practical Applications: Mathematics is applied in various fields such as science, engineering, technology, finance, and economics. Understanding Ordinary Mathematics enables learners to apply mathematical principles in practical scenarios and make informed decisions based on data and analysis.
4. Problem-Solving Skills: Mathematics teaches learners how to analyze problems, break them down into manageable parts, and develop systematic approaches to find solutions. Problem-solving skills cultivated through Ordinary Mathematics are transferable to diverse situations.
5. Critical Thinking and Analytical Skills: Studying mathematics helps learners develop critical thinking skills, analytical reasoning, and the ability to evaluate information logically. These skills are valuable for addressing complex challenges and making sound decisions.

6. Numeracy and Quantitative Literacy: Numeracy, or numerical literacy, is essential for interpreting and making sense of quantitative information in various contexts. Ordinary Mathematics equips learners with the numeracy skills needed to navigate today's data-driven world.
7. Enhanced Cognitive Development: Mathematics education contributes to cognitive development by fostering abstract thinking, spatial reasoning, pattern recognition, and mathematical creativity. Engaging in mathematical activities stimulates brain development and enhances problem-solving abilities.
8. Global Competitiveness: In an increasingly interconnected and technology-driven world, proficiency in mathematics is essential for global competitiveness. Learners with strong mathematical skills are better prepared to succeed in a rapidly evolving and technologically advanced society.
9. By teaching Ordinary Mathematics, educators aim to equip learners with the knowledge, skills, and mindset needed to succeed academically, professionally, and personally. Mathematics serves as a universal language that empowers individuals to navigate complex challenges, make informed decisions, and contribute to society's progress and innovation.

The Structure of the Syllabus

The structure of Form 1 to 4 Mathematics syllabuses typically follows a sequential order to introduce and build upon fundamental mathematical concepts. The general outline of the structure of the Mathematics syllabus begins with topics, sub-topics, specific competences, learning activities and end with expected standard. Some topics may be similar across the forms, but the levels of knowledge, skills and values to be attained are not the same. The arrangement is done in this order for easy of reference. Hence, when preparing lessons teachers should strive to build interconnectivity of concepts to promote learners' conceptual understanding. This syllabus envisages that by following this structured outline, learners can systematically progress through Mathematics, mastering foundational mathematical principles and skills necessary for further studies in mathematics and related disciplines.

Mathematical Competence

Mathematical competence is the ability to develop and apply mathematical thinking in order to solve a range of problems in everyday situations. Mathematical competences involve the ability and willingness to use Mathematical modes of thought (logical and spatial thinking) and presentation (formulas, models, constructions, graphs, charts). The mathematics competence is developed step-by step over a period of instruction after learning a set of specific competencies.

Specific Competences

In mathematics, a specific competence refers to a particular skill, value, or knowledge and attitude that enables learners to perform a specific mathematical task, solve a particular type of problem, or demonstrate understanding of a distinct mathematical concept. This may be achieved after performing several learning activities for a specific instruction.

Learning Activity

A learning activity in Mathematics is a task or experience designed to engage learners in the process of learning Mathematical concepts, skills, or problem- solving strategies. It is a purposeful and structured experience that aims to promote Mathematical understanding, reasoning, and communication. These learning activities ought to help a learner to develop specific competence based on his or her physical and mental redness..

Expected Standard

These are sets of performance conditions for the learners to acquire a specific competency

Suggested Teaching Methodology

Teaching Methodology/ strategy for Ordinary Mathematics I will include the following:

1. **Demonstrations**: Use visual aids, manipulatives, and real-world examples to help learners to visualize and understand abstract Mathematical concepts. Demonstrations can make complex ideas more tangible and easier to comprehend.
2. **Problem-Solving**: Encourage Learners to actively participate in problem-solving activities to apply mathematical concepts in different contexts. Provide a variety of problems with varying levels of complexity to challenge learners and promote critical thinking skills.
3. **Collaborative Learning**: Facilitate group activities, discussions, and projects to promote collaborative learning among Learners. Working together on mathematical problems can foster teamwork, communication skills, and peer-to-peer support.
4. **Technology Integration**: Incorporate technology tools such as graphing calculators, online resources, and educational software to enhance the learning experience. Utilize interactive apps and simulations to explore mathematical concepts dynamically.
5. **Practice and Feedback**: Assign regular practice exercises, homework assignments, and quizzes to reinforce learning and assess understanding. Provide prompt feedback to learners on their work to guide them towards improvement and mastery of mathematical skills.
6. **Real-World Applications**: Connect mathematical concepts to real-world scenarios and applications to demonstrate the relevance and practicality of mathematics in everyday life. Show how mathematics is used in various fields such as shopping, cooking, personal finance, health and wellness, travel, home improvement, gardening, sports and fitness, music, art and design, building and construction, science and engineering, data analysis, environmental science, navigation and transportation among others.
7. **Differentiated Instruction**: Recognize and accommodate students' diverse learning styles and abilities by offering differentiated instruction. Provide additional support for students who need it and offer enrichment opportunities for those who excel in mathematics.

Time Allocation

The standard minimum learner-teacher contact time for Ordinary Mathematics I at secondary school level(Form 1 - 4) is 6 periods per week, translating into 4 hours per week. The duration for a single period is 40 minutes. This should give ample time for learners' hands on activities.

Assessment

Ordinary Mathematics I will be typically assessed using a variety of ways in order to evaluate learners' understanding, knowledge and proficiency in mathematical concepts. Here are some common assessment methods for Ordinary Mathematics:

1. **Tests and Examinations**: Traditional written assessments, including unit tests, mid-term exams, end of term tests and final exams will be used to evaluate learners' knowledge of mathematical principles, problem-solving skills, and ability to apply concepts.
2. **Homework Assignments:** Assigning regular homework exercises will allow learners to practice and reinforce the concepts learned in class. Homework assignments can be used to assess understanding, provide feedback, and monitor learner progress.
3. **Projects and Presentations:** Group or individual projects that involve real-world applications of mathematics can be used to assess learners' ability to apply mathematical concepts and think critically. Presentations will allowlearners to communicate their findings and demonstrate their understanding.
4. **Problem-Solving Tasks:** Problem-solving tasks, will challenge learners to apply mathematical reasoning and analytical skills to solve complex problems. These tasks will assess learners' ability to think logically and creatively.
5. **Quizzes and Mini-Assessments:** Short quizzes and mini-assessments will be used to gauge learners' understanding of specific topics, provide formative feedback, and identify areas for improvement.
6. **Open-Ended Questions**: Including open-ended questions in assessments will allow learners to demonstrate their understanding in a more flexible and creative way. These questions can assess higher-order thinking skills and problem-solving abilities.
7. **Peer Assessment**: Peer assessment activities, where learners evaluate each other's work based on specific criteria, will promote collaboration, communication skills, and provide alternative perspectives on learner performance.
8. **Online Assessments**: Utilizing online platforms for assessments, such as quizzes or interactive exercises, can provide immediate feedback to learners and allow for adaptive learning paths based on individual progress.
9. **Cumulative Assessments**: Cumulative assessments that cover multiple topics or units can assess learners' ability to integrate and apply their knowledge across different mathematical concepts.

By using a combination of these assessment methods, educators can gain a comprehensive understanding of students' mastery of Ordinary Mathematics 1 concepts and skills, and provide targeted feedback to support student learning and growth.

COMPETENCES TO BE DEVELOPED

S/N	COMPETENCE	DESCRIPTORS
1	**Analytical Thinking**	• Grasp and breakdown information and effectively share with others. • Break down a problem • Test Hypotheses • Apply SWOT analysis • Evaluate solution
2	**Communication**	• Use appropriate language (verbal and non-verbal) in different situation • Apply good listening, speaking, reading and writing skills • Express oneself using different media and symbols
3	**Creativity and Innovation**	• Undertake a project • Organize information and ideas • Justify one's reasoning and procedures • Ask thoughtful questions • Understand connections between seemingly unrelated subject matter • Generate ideas, possibilities and actions from existing ones. • Express one's ideas through life experiences • Recycle waste material to create new value • Use alternative processes to understand topics • Re-define problems and create new solutions
4	**Collaboration**	• Work with others in finding solutions to daily challenges. • Respect the views of group members while working together. • Participate fully in the group towards accomplishing a given task • Listen to other group members and make meaningful contribution to a given task
5	**Critical Thinking**	• Solve complex problems • Breakdown texts, to improve the ability to understand • Analyse ideas and adjust them accordingly • Establish opinions about what is right and wrong • Solve problems with innovative solutions • Deal with life challenges effectively • Ensure opinions are based on facts • Become more open minded towards different views • Make one's own decision and form own opinion Evaluate the credibility of sources of information

		• Collect specific information and present findings of the same. • Analyze information from various sources. • Ask the right questions. • Think about both the short and long consequences of one's action. • Evaluate the credibility of sources of information. • Use case studies and real-life scenarios to solve a complex problem • Participate in debates and discussions on global issues. • Take risks with ideas.
6	**Digital Literacy**	• Demonstrate advanced proficiency in software tools for productivity • Set up group and conference calls, on-line meetings • Keep account record • Upload and download information • Produce graphs for data analysis • Demonstrate programming skill in at least one high-level language* • Evaluate and apply emerging technologies • Analyze and synthesize complex digital information • Exhibit ethical leadership and responsibility in digital contexts • Exhibit proficiency in using a wide range of soft- ware tools and application • Apply knowledge in coding with one or more programming languages • Work with data, through data analysis, visualization and data base management • Understand cyber security principles and practices to protect personal and organizational data • Manage digital projects by effective planning and executing • Communicate responsibly using social media • Perform successful online research.
7	**Entrepreneurship**	• Understand basic concepts of sources of income, saving, budgeting and investment.
8	**Financial Literacy**	● Understand foreign currencies ● Calculate exchange rates ● Set financial goals ● Make a saving plan ● Prepare a simple budget ● Calculate interest
9	**Problem Solving**	• Weigh up evidence and make appropriate decisions best on experiences and relevant learning. ● Use analogies to identify similarities among objects to establish relationships among the known and unknown.

FORM 1

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	LEARNING ACTIVITIES	EXPECTED STANDARDS
1.1 NUMBERS	**1.1.1 Classification of Numbers**	1.1.1.1 Aply classification of numbers in real life context	• Exploring properties of different types of numbers (*natural numbers, whole, integers, prime numbers, even numbers, odd numbers, rational and irrational numbers, composite numbers*) using materials (*puzzles, number cards, games…)* • Investigating the factors and multiples of numbers • Investigating ways of finding highest common factor (HCF) and lowest common multiple (LCM) (*prime factorization, listing…)* • Creating number patterns (*games, puzzles…)*	Numbers applied in real life situations consistently
	1.1.2 Combined Operations on Real Numbers	1.1.2.1 Aply combined Operations on real numbers in real life situations	• Solving real life situations using combined operations.	Combined operations on real numbers applied in everyday life situations correctly
1.2 INTEGERS	**1.2.1 The Four Operations on Integers**	1.2.1.1 Use Integers in real life	• Exploring the applications of the four operations (*addition, subtraction, multiplication, division*) on integers in real life situations (*temperatures, bank account balance, share market, index goal, difference…)*	Integers used in real life correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	LEARNING ACTIVITIES	EXPECTED STANDARDS
1.3 APPROXIMATIONS AND ESTIMATION	**1.3.1 Approximation**	1.3.1.1 Use approximation to make informed decisions in real life	• Exploring approximations in real life situations. • Investigating the significance of figures in measures • Expressing measures (*whole and decimal*) to a required number of significant figures • Exploring ways of expressing large and small measures • Exploring scientific notations $(a \times 10^n)$ using scientific calculators and activities (*notation Maze, scientific notation Bingo, scientific notation escape, room activity, card games…*) • Approximating measures in scientific notation to a given degree of accuracy	Approximations used to make informed decision in real life appropriately
	1.3.2 Estimations	1.3.2.1Use Estimation to make informed decisions in real life	• Estimating measures and comparing them with actual measurements • Interpreting the absolute, relative percentage errors and tolerance in real life	Estimation to make informed decisions in real life used correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	LEARNING ACTIVITIES	EXPECTED STANDARDS
			context (*height, packaging, designing…*)	
1.4 SETS	**1.4.1 Operations on Sets**	1.4.1.1 Apply set operations in real life context	• Creating sets using information gathered by learners (*both numerical and descriptive*) • Exploring different forms of set representation (*listing, number line, set builder notation, Venn diagram; difference between elements and number of elements on Venn diagram)* • Exploring and interpreting various single and combined set operations (*intersection*(∩)*, union* (∪) *complement(Ac), set difference (-)*) through games and real-life activities (*event planning, email management, task management, shopping list, scores of an experiment, tests...up to 3 sets*) • Representing combined operations on Venn diagram using tools *(computers, paperboard, chalkboard… up to3 sets*)	Set operations applied in real-life context correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	LEARNING ACTIVITIES	EXPECTED STANDARDS
1.5 ALGEBRA	**1.5.1 Algebraic Expressions**	1.5.1.1 Apply algebraic expressions in real life	• Exploring and formulating algebraic expressions from everyday life activities (*using letters to represent the number of things, managing budgets, planning, production, tracking expenses, scheduling activities, measures…)* • Distinguishing variables and coefficients in an algebraic expression • Grouping like and unlike terms • Simplifying algebraic expressions (*addition, subtraction, division, multiplication)* • Evaluating algebraic expressions by substituting numerical values	Algebraic expressions applied in a variety of real-life situations
1.6 MATRICES	**1.6.1 Operations on Matrices**	1.6.1.1 Apply Matrices to real life situations	• Formulating matrices from real life situations (*making a pay roll, shop records, distribution of resources, planning…)* • Identifying the order of matrices • Transposing matrices • Exploring various types of Matrices and their properties (*singular, equal, identity matrices ...)*	Matrices applied to real life situations correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	LEARNING ACTIVITIES	EXPECTED STANDARDS
			• Carrying out operations on matrices in real life situations (*Addition, subtraction, multiplication; matrix by a scalar, matrix by matrix up to 2 x 2)*	
1.7 ANGLES	**1.7.1 Angles associated with straight lines**	1.7.1.1 Use angles associated with straight lines in everyday life	• Exploring the relationship of angles and straight lines using tools (*geometrical instruments, geoboards, computer software…)* • Distinguishing angles associated with parallel lines (*corresponding angles, vertically opposite, alternate angles, straight line angles…*) • Using angles associated with straight lines in solving practical problems	Angles associated with straight lines used in everyday life correctly
	1.7.2 Angle of Elevation and Depression	1.7.2.1 Use Angle of Elevation and Depression everyday life	• Exploring angles of depression and elevation practically using real life situations • Distinguishing angles of elevation and depression in real life situations • Finding the angle of depression and elevation	Angle of Elevation and Depression used in everyday life correctly
1.8 TRIGONOMETRY	**1.8.1 Pythagoras Theorem**	1.8.1.1 Use the Pythagoras theorem to solve problems in different contexts	• Exploring Pythagoras theorem through practical activities (*a ladder against a wall, creating Geo board with squares and triangles…)*	Pythagoras theorem used to solve problems in different contexts correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	LEARNING ACTIVITIES	EXPECTED STANDARDS
			• Investigating sides of the right-angled triangle (*two adjacent sides and hypotenuse)* • Deriving the Pythagoras theorem ($a^2 + b^2 = c^2$) • Solving real life problems using Pythagoras Theorem	
1.9 STATISTICS	**1.9.1 Statistical Presentations and Measures of central tendency**	1.9.1.1 Apply statistics in making informed decisions in real life	• Collecting data from the environment using various ways (*height, shoe sizes, Favorite colour…)* • Distinguishing between qualitative and quantitative data • Distinguishing between discrete and continuous data • Representing data in different ways (*tally chart, Histogram, frequency polygons, frequency tables)* recognizing possible limitations • Interpreting data represented in different forms *(histogram, frequency density, frequency polygons, frequency tables*) • Applying measures of central tendency (*mean, mode and median*) of grouped data (*in test scores, average income…)*	Statistics applied in making informed decisions in real life appropriately

FORM 2

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
2.1 COORDINATE GEOMETRY	**2.1.1 Cartesian Plane**	2.1.1.1 Use the concept Cartesian Plane to solve problems in real life situations	• Exploring ways of describing a location (*grids, maps, sitting arrangement…)* • Exploring the Cartesian Plane (XOY plane) and label it (*x-axis, y- axis, origin)* • Plotting and reading ordered pairs on the XOY plane, (x,y) starting with the x – coordinate followed by the y-coordinate • Joining points on the XOY plane to come up with different shape (*triangles, quadrilaterals…)* • Creating different patterns using the Cartesian plane	The concept of the Cartesian Plane applied in real life correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
	2.1.2 Straight lines on the Cartesian Plane	2.1.2.1 Use straight lines to solve problems in real life	• Explore the cartesian plane and its usefulness in real life (cost *benefit analysis, demand and supply…)* • Exploring the straight line on the Cartesian Plane • Determining the mid-point of two points • Determining the gradient of a straight line on the Cartesian plane • Graphing straight lines *(x=a, or y=b or y=x, y = -x, y=mx + c*) • Finding the equation of a straight line given: gradient and a point, gradient and intercept, double intercept form (*two points*) • Determining the gradient of a straight line from the equation • Drawing parallel lines and compering their gradients • Drawing perpendicular lines and compering their gradients	Straight Lines used correctly to solve problems in real life situations.
2.2 RELATIONS AND FUNCTIONS	**2.2.1 Relations**	2.2.1.1Apply relations to model and solve problems	• Exploring the types of relations in real life situations. (*One to one, One to many, many to one, many to many*)	Relations to model and solve problems applied correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
			• Representing relations using arrow diagrams/mappings, ordered pairs	
	2.2.2 Functions	2.2.2.1 Apply functions to model and solve problems	• Determining which relations are functions and non-functions • Representing a function as $f(x) = a\,, f: x \rightarrow y$ • Finding the range given the domain and vice versa • Finding a function given a set of ordered pairs • Investigating the Inverse of a function using real life situations (*order of parking and unparking a box…*) • Determining a function without an inverse • Exploring composite functions • Solving problems involving composite functions	Functions to model and solve problems applied correctly
2.3 ALGEBRA	**2.3.1 Basic Processes of Algebra**	2.3.1.1 Use algebraic expressions in problem solving	• Exploring real life situations involving expanding *(monomial by binomial and binomial by binomial*) • Model real life situation using algebraic expressions and simplify them (*managing budgets, planning, production, tracking expenses, scheduling activities…*) • Factorizing linear and quadratic expression	Algebraic expressions applied in problem solving correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
			(*common factor, grouping terms, difference of two squares, quadratic expression*) • Simplifying algebraic fractions	
2.4 POLYGONS	**2.4.1 Regular and Irregular Polygons**	2.4.1.1 Create different objects using polygons	• Exploring the different types of polygons (*regular and irregular*) • Exploring the sides and angles of polygons • Calculating the interior and exterior angles of polygons • Determining the sum of interior angles of a polygon • Using properties of polygons, in creating objects	Polygons used to create different objects appropriately
2.5 SYSTEMS OF EQUATIONS	**2.5.1 Simultaneous Equations**	2.5.1.1 Use simultaneous equations in real life situations.	• Exploring situations that give rise to equations in one variable and two variables • Solving equations in one variable • Solving simultaneous linear equations using elimination, substitution and graphical methods (in two variables)	Simultaneous Equations used in problem solving correctly
2.6 TRAVEL GRAPHS	**2.6.1 Distance time Graphs**	2.6.1.1 Apply distance time graphs in a variety of perspectives	• Exploring the relationship between time, distance, and speed • Computing average speed, distance and time	Distance Time graphs applied in a variety of perspectives appropriately

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
			• Sketching distance-time graphs to represent real world situation • Interpreting distance time graphs	
	2.6.2 Velocity time Graphs	2.6.2.1 Apply velocity time graphs in a variety of perspectives	• Determining acceleration and retardation/deceleration *(word problems)* • Sketching Velocity-time graphs to represent real world situation • Calculating the area under a velocity time graph • Relating area under a graph to distance travelled • Interpreting velocity time graphs	Velocity Time graphs applied in a variety of perspectives appropriately
2.7 FINANCIAL ARITHMETIC	**2.7.1 Financial Interest**	2.7.1.1 Apply the Financial Interest in everyday life	• Exploring scenarios for compound interest in real life (*the positive and negative effects of compound interest)* • Determining compound interest • Exploring the concept of hire purchase • Carrying out calculations involving hire purchase	Financial interest applied in everyday life correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
	2.7.2 Investment	2.7.2.1 Apply the concept of Investment in everyday life	• Investigating types of tax (*income tax and value added tax*) • Exploring the difference between income tax and value added tax (*VAT*) • Solving problems related to income tax and value added tax • Exploring the meaning of investment • Establishing the different types of investment (shares and investment bonds) • Exploring the relationship among the types of investments • Carrying out calculations that involve investments	The concept of Investment applied in everyday life appropriately

FORM 3

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
3.1 INDEX NOTATION	**3.1.1 Indices**	3.1.1.1 Use index notation in problem solving	• Exploring index notation (*positive, negative, fractional and zero indices…)* • Evaluating indices with positive, negative, fractional and zero index • Solving equations involving indices of the form $x^a = b,\ a^x = b$ • Modelling real life *dynamics* situations using indices (*infection rate, half-life, population, climate patterns……*)	Index notation used in problem solving correctly
3.2 SHAPES	**3.2.1 Two Dimensional Shapes (circle)**	3.2.1.1 Use the concept of Two-dimensional shapes in real life situations	• Exploring the parts of a circle. (*radius, diameter, chord, arc, sector and segment*) • Exploring angle properties of a circle • Determining the relation between the circumference and the diameter of a circle (π) • Determining the circumference of a circle, sector and segment	Concept of Two-dimensional shapes used correctly in real life situations
	3.2.2 Three Dimensional Shapes	3.2.2.1 Use the concept of Three-dimensional shapes in real life situations	• Exploring three-dimensional shapes and their nets (*face, edge and vertex*) in real life(Ice *cream Cones, waste bins…*) • Finding the total surface area of a cylinder, triangular prism, pyramid ,cone and other shapes in the environment • Finding the volume of a, cylinder, triangular prism, pyramid and cone • Determining the volume of a frustum (*pyramid, cone)* • Making three-dimensional shapes	Concept of Three-dimensional shapes used correctly in real life situations

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
3.3 SYMMETRY	**3.3.1 Symmetry of 2 Dimensional Shapes**	3.3.1.1 Apply the concept of 2-Dimensional symmetry in real life context	• Exploring rotational symmetry in 2 dimensional shapes • Determining the order of rotational symmetry • Finding the angle of rotational symmetry • Describing the rotational symmetry of a 2dimensional shape	Concept of 2-Dimensional symmetry applied correctly in real life context
	3.3.2 Symmetry in 3 Dimensional Shapes	3.3.2.1 Apply the concept of 3-Dimensional symmetry in real life context	• Exploring reflectional symmetry of 3dimensional objects (*plane symmetry*) • Determining the number of planes of symmetry of an object • Exploring, rotational symmetry in 3 dimensional shapes • Determining the order of rotation in 3 dimensional shapes • Determining the angle of rotation about a given axis • Describing the rotational symmetry of a 3dimensional shapes • Creating designs/models using knowledge of symmetry	Concept of 3-Dimensional symmetry applied correctly in real life context

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
3.4 CONSTRUCTION	**3.4.1 Geometrical Constructions**	3.4.1.1 Apply geometric construction in real life	• Constructing line Bisectors • Constructing parallel and perpendicular lines • Constructing $60°$ *and* $90°$ angles (*using appropriate tools*) • Constructing angle Bisector • Constructing various geometrical figures using geometric equipment (polygons…) • Construct basic designs (*floor plans, table surfaces, clothing sketches…*)	Geometric construction applied in real life appropriately
3.5 LOCUS	**3.5.1 Loci in Two Dimensions**	3.5.1.1 Use locus of points in a variety of real-life situations	• Exploring locus of points in 2 dimensions. (*points equidistant from two fixed points, points equidistant from a fixed point, points equidistant from two intersecting lines, points equidistant from a line*) • Plotting points according to a given rule by any means that allow accuracy • Describing sets of points in real life that conform to a rule • Constructing the locus of points in two dimensions by any means that allow accuracy (*locus of points from a given point, two given points, a given line and two given lines*) • Creating the Intersection of Loci • Investigating locus of points in three dimensions (computers software …)	Locus of points used in a variety of real life situations correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
3.6 SIMILARITY AND CONGRUENCE	**3.6.1 Similar Figures**	3.6.1.1 Apply concept of similar figures in real life context	• Exploring similar figures (*sides and angles*) • Exploring linear ratio, area ratio and volume ratio in relation to similarity • Finding the ratio of the area using the ratio of the sides • Finding the ratio of the sides using the ratio of the area • Calculating the area of an object using the ratio of the areas • Exploring the meaning of scale • Determining the appropriate measurements to use in relation to the actual measurement • Finding the length and the area on a map using scale • Finding the ratio of the volume using the ratio of the sides • Finding the ratio of the sides using the ratio of the volume • Calculating the volume of an object using the ratio of the volumes	Concept of Similar figures applied in real life context appropriately
	3.6.2 Congruent Figures	3.6.2.1 Apply concept of Congruent figures in real life context	• Exploring the properties of congruency • Create artifacts using the concept of congruency	Concept of Congruent figures applied in real life context appropriately

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
3.7 STATISTICS	**3.7.1 Cumulative Frequency and Measures of Dispersion**	3.7.1.1 Use statistics in real life to make informed decisions	• Constructing Cumulative frequency tables. (*budgeting when ensuring total budget allocation is not exceeded…*) • Utilizing Cumulative frequency tables to construct Cumulative frequency curves • Determining the median from cumulative frequency curves • Determining the interquartile range and semi inter quartile range • Interpreting the interquartile range and semi inter quartile range • Determining Percentiles from a cumulative frequency curve • Computing variance and standard deviation for ungrouped and grouped data • Interpreting and comparing data using standard deviation	Statistics used in real life to make informed decisions appropriately

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
3.8 BEARINGS AND SCALE DRAWING	**3.8.1 Compass and Three Figure Bearings**	3.8.1.1 Use bearings in real life	• Exploring compass directions (*north, east, west, south and directions in between such as northeast, south east…*) • Exploring bearings *(sitting positions, Global Positioning System: GPS…)* • Presenting the bearing of a point from another using angles • Finding the three-figure bearing of a one point from another • Drawing accurate diagrams to a given appropriate scale to represent directions • Creating and interpreting reference maps using the concept of bearings	Bearings used in real life appropriately

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
3.9 VARIATIONS	**3.9.1 Types of Variations**	3.9.1.1 Apply variations to solve real world problems	• Exploring real life situations in which direct variation and inverse variations arise (*speed, and stopping time, carbon emission and rainfall…)* • Expressing direct variation in algebraic form • Solving problems involving direct variation • Expressing inverse variation in algebraic form • Solving problems involving Inverse variation • Exploring real life situations in which joint variation arises (*carbon emission, global warming and reduced rainfall…)* • Expressing joint variation in algebraic form • Solving problems involving joint variation	Variations applied to solve real world problems correctly
3.10 MATRICES	**3.10.1 Operations on 2x2 Matrices**	3.10.1.1 Apply the concept Matrices to solve a variety of real-life problems.	• Exploring the determinant of a 2X2 matrix including matrices whose determinant is zero (singular matrix) • Using the determinant of a 2x2 to determine a missing value in the matrix • Exploring the inverse of a matrix • Finding the inverse of a 2x2 matrix • Using matrices in solving simultaneous equations in two variables arising from real life situations	Concept of Matrices applied to solve a variety of real-life problems correctly

FORM 4

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
4.1 QUADRATIC EQUATIONS AND FUNCTIONS	**4.1.1 Quadratic Equations**	4.1.1.1 Apply quadratic Equations to model and solve problems	• Formulating quadratic equations from real life situations • Solving quadratic equations by (*factorization, completing the square and formula method)* •Applying quadratic equations in real life situations	Quadratic equations applied to model and solve problems correctly
	4.1.2 Quadratic Functions	4.1.2.1Apply quadratic functions to model and solve problems	• Investigating the Meaning of quadratic functions $(f(x) = ax^2 + bx + c, a \neq 0$ • Finding the domain and codomain of a quadratic function • Exploring the nature of a quadratic function (*maximum and minimum*) • Finding the maximum and minimum • Determining the x and y intercepts • Sketching the graphs of quadratic function • Using technologies to explore quadratic functions	Quadratic functions applied to model and solve problems correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
4.2. LINEAR PROGRAMMING	**4.2.1 Inequations**	4.2.1.1 Utilize Inequations in real life situations	• Drawing graphs of linear Inequations in one and two variables • Shading the unwanted region of a system of Inequations • Interpreting the wanted and unwanted regions • Finding inequations from already drawn systems of Inequations	Inequations utilized in real life situations correctly
	4.2.2 Linear Programming	4.2.2.1 Utilize linear programming in real life situations.	• Forming linear inequations based on real life situations • Interpreting specialized vocabulary in linear programming *(constraint, feasible region, objective function…)* • Representing the inequations on the graph and identifying the required region • Finding and interpreting the optimum solution of a set of linear inequations in two unknowns in real life situations (*maximizing profit, minimizing losses…)* • Using the search line to determine minimum and maximum values	Linear programming Utilized in real life situations correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
4.3 VECTORS	**4.3.1 Vectors in 2 Dimensions**	4.3.1.1Apply vectors in problem solving	• Exploring the concept of vectors (properties of vectors) • Expressing vectors in different forms *(directed line segment, component form*) • Adding and subtracting vectors • Applying translations on position vectors • Finding the magnitude of a vector • Exploring scalar multiples of factors • Multiplying vectors by a scalar • Determining parallelism of vectors • Solving problems involving vector geometry	Vectors applied in problem solving appropriately

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
4.4 TRIGONOMETRY	**4.4.1 Introduction to Trigonometry**	4.4.1.1 Use Trigonometry in problem solving	• Exploring the relationship between the sides and the angles in right angled triangles • Applying sine, cosine and tangent ratios to the right-angled triangle in finding missing angles and sides • Exploring special angles ($30°, 45° and\ 60°$) • Determining the signs of the three trigonometric ratios in the quadrants. • Exploring the relationship between the sides and the angles in non-right angled triangles (*sine and cosine rule*) • Applying sine and cosine rules to solve real life problems. (*distance and area*)	Trigonometry in problem solving used correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
4.5 GEOMETRICAL TRANSFORMATIONS	**4.5.1 Isometric Transformations**	4.5.1.1 Apply Isometric Transformations to problem solving	• Exploring the concept of Isometric Transformations (*Orientation, shape, area: Translation, Reflection, Rotation*) • Using a column vector to link objects to their images • Describing a translation given an object and image • Reflecting objects using the coordinate plane • Finding the mirror line • Reflecting objects by matrix method • Describing a Reflection given an object and image • Exploring the rotation of objects, (*clockwise, anticlockwise*) • Finding the image given object, centre, angle and direction (*using geometrical instruments, matrices and technology*) • Finding centre, angle and direction of rotation • Describing a Rotation given an object and image	Isometric Transformations applied to problem solving correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
	4.5.2 Non-Isometric Transformations	4.5.1 Apply Isometric Transformations to problem solving	• Exploring the concept of Non-Isometric Transformations (*Orientation, shape, area: Enlargements, Shear, Stretch*) • Finding the centre of Enlargement and scale factor • Finding the image given scale factor and centre of enlargement • Describing an enlargement given an object and image • Exploring Stretching of objects • Finding centre, area, scale factor, invariant line and stretch matrix. • Stretching objects using different methods *(construction and matrix method)* • Describing a Stretch given an object and image • Exploring Shearing of objects • Finding the shear factor, invariant line and shear matrix • Shearing objects by different methods such as	Non-Isometric Transformations applied to problem solving correctly

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
			construction and matrix method • Describing a Shearing given an object and image • Exploring combined transformations of objects • Describing combined transformation given an object	

TOPIC	SUB-TOPIC	SPECIFIC COMPETENCES	SUGGESTED ACTIVITIES	EXPECTED STANDARDS
4.6 PROBABILITY	**4.6.1 Introduction to Probability**	4.6.1.1 Use the concept of Probability to make informed decisions in various aspects of life	• Exploring probability in real-life situations (*rainfall patterns, power outage, traffic jam, meeting a friend, simulations…)* • Expressing the basic interpretations of probability range (*certainty, Impossible, possible, sum of all possibilities*) • Expressing probability events in relation with the number of favorable outcomes to the number of all possible outcomes • Exploring the concept of Theoretical and experimental Probability • Investigating probability of Independent, mutually exclusive events *(tree diagrams, grids, set notation…)* • Exploring probability of compound events	Concept of probability to make informed decisions in various aspects of life used correctly

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