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Dr Lyabwene M. Mtahabwa
Commissioner for Education

MATHEMATICS SYLLABUS FOR ORDINARY SECONDARY
EDUCATION FORM I - IV
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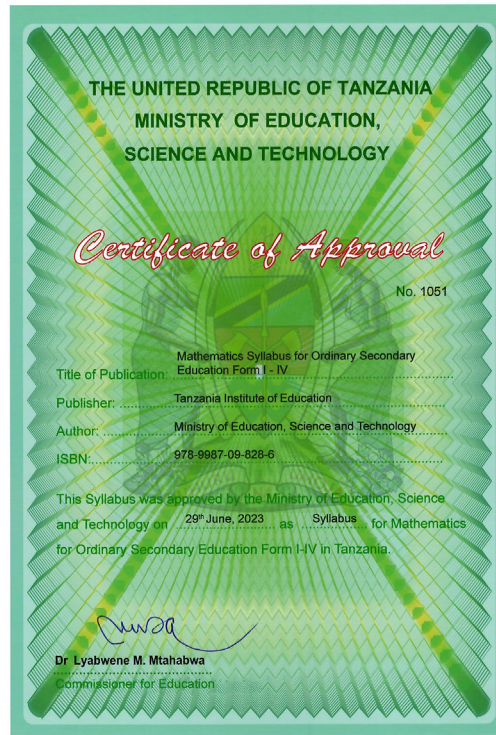This document should be cited as: Ministry of Education, Science and Technology (2023). *Mathematics Syllabus for Ordinary Secondary Education Form I – IV.* Tanzania Institute of Education.

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Abbreviations and Acronyms

ICT Information and Communication Technology

TIE Tanzania Institute of Education

TSL Tanzanian Sign Language

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Dr Aneth A. Komba
Director General
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1.0 Introduction

Mathematics for Ordinary Secondary Education is a compulsory subject for Form I-IV students in the General Education. Studying Mathematics provides students with a comprehensive understanding of operations, algorithms and applications of numbers in communicating ideas. It also plays an important role in equipping students with knowledge and skills to think logically, critically, analytically and appreciate the value of Mathematics in solving real-world challenges. Moreover, it allows students to develop skills that can be applied in various fields, promoting self-reliance in project planning, budget management, and effective debating for socio-economic development.

This syllabus is designed to guide the teaching and learning of mathematics at Ordinary Secondary Education, Form I-IV, in the United Republic of Tanzania. The syllabus interprets the competences indicated in the 2023 Ordinary Secondary Education Curriculum. It also provides teaching and learning opportunities that guide teachers to apply different methods and strategies to promote students' mathematical literacy and develop 21st century skills which include creativity, communication, collaboration, critical thinking and problem solving.

2.0 Main Objectives of Education in Tanzania

The main objectives of providing education in Tanzania are to enable every Tanzanian to:

(a) Develop and improve his or her personality so that he or she values himself or herself and develops self-confidence;

(b) Respect the culture, traditions and customs of Tanzania; cultural differences; dignity; human rights; attitudes and inclusive actions;

(c) Apply science and technology, creativity, critical thinking, innovation, cooperation, communication and positive attitudes for his or her development and the sustainable development of the nation and the world at large;

(d) Understand and protect national values, including dignity, patriotism, integrity, unity, transparency, honesty, accountability and the national language;

(e) Develop life and work-related skills to increase efficiency in everyday life;

(f) Develop a habit of loving and valuing work to increase productivity and efficiency in production and service provision;

(g) Identify and consider cross-cutting issues, including the health and well-being of the society, gender equality, as well as the management and sustainable conservation of the environment; and

(h) Develop national and international cooperation, peace and justice in accordance with the Constitution of the United Republic of Tanzania and international conventions

3.0 Objectives of Ordinary Secondary Education-General Education

The objectives of Ordinary Secondary Education-General Education are to:

(a) Strengthen, expand and develop a deeper understanding of the knowledge, skills, and attitude developed at primary education;

(b) Safeguard customs and traditions, national unity, national values, democracy, respect for human and civic rights, duties and responsibilities embedded with those rights;

(c) Build self-confidence and the ability to learn in various fields, including science and technology, and to gain theoretical and practical knowledge;

(d) Improve communication using the Tanzania Sign Language, Tactile Language, Kiswahili and English. The student should be encouraged to learn at least one additional foreign language, depending on the school context;

(e) Increase accountability in cross-cutting social issues, including health, security, gender equality, and sustainable environmental conservation;

(f) Build competence and various skills which will enable the student to employ himself or herself, to be employed and to live comfortably by exploiting well his or her environment; and

(g) Develop the readiness to continue with advanced secondary and tertiary education.

4.0   General Competences for Ordinary Secondary Education-General Education

The general competences that will be developed by a student are to:

(a)   Use the knowledge and skills acquired in the Primary Education stage to strengthen and expand academic understanding;

(b)   Value citizenship and national customs;

(c)   Demonstrate confidence in learning various professions including science and technology, theoretical and practical knowledge;

(d)   Use language skills including Tanzanian Sign Language (TSL), Kiswahili language, English Language, and at least one other foreign language to communicate;

(e)   Use knowledge of cross-cutting issues to manage the environment around them; and

(f)   Use knowledge and skills to enable a student to be self-employed, employable, and manage life and conserve the environment.

5.0   Main and Specific Competences

The main and specific competences to be developed are presented in Table 1.

Table 1: *Main and Specific Competences for Form I-IV*

No	Main competences	Specific competences
1.0	Demonstrate mastery of mathematical language	1.1 Use numerical skills in different contexts 1.2 Use ratios and proportions in daily life 1.3 Use rates and variations in different contexts
2.0	Demonstrate mastery of basic concepts in geometry and algebra	2.1 Use geometry, approximations, relations, and functions in various contexts 2.2 Use algebra and matrices in problem solving 2.3 Use sets, sequences and series in problem solving

3.0	Demonstrate mastery of basic concepts in coordinate geometry, trigonometry, circles, vectors, probability and statistics	3.1 Use basic coordinate geometry, trigonometry, and vectors skills in daily life 3.2 Use probability in problem solving 3.3 Use statistics in problem solving

6.0 Roles of Teachers, Students, and Parents in Teaching and Learning Process

The syllabus for Mathematics recognises that a good relationship between teachers, students, and parents/guardians is fundamental to ensure successful learning. This section outlines the roles of each participant in facilitating effective teaching and learning of Mathematics for Ordinary Secondary Education.

6.1 The teacher

The teacher is expected to:

(a) Help the student to learn and acquire the intended competencies in Mathematics;

(b) Use teaching and learning approaches that will allow students with different needs and abilities to:

   (i) develop the competencies needed in the 21st century;

   (ii) actively participate in the teaching and learning process;

(c) Use student centred instructional strategies that make the student a centre of learning which allow them to think, reflect and search for information from various sources;

(d) Create a friendly teaching and learning environment;

(e) Prepare and improvise teaching and learning resources;

(f) Conduct formative assessment regularly by using tools and methods which assess theory and practice;

(g)   Treat all the students equally irrespective of their differences;

(h)   Protect the student while at school;

(i)   Keep track of the student's daily progress;

(j)   Identify the individual student's needs and provide the right intervention;

(k)   Involve parents/guardians and the society at large in the student's learning process; and

(l)   Integrate cross-cutting issues and ICT in the teaching and learning process;

6.2 The student
The student is expected to:

(a)   Develop the intended competences by participating actively in various learning activities inside and outside the classroom; and

(b)   Participate in the search for knowledge from various sources, including textbooks, reference books and other publications in online libraries.

6.3 The parent
The parent/guardian is expected to:

(a)   Monitor the child's academic progress in school;

(b)   Where possible, provide the child with the needed academic support;

(c)   Provide the child with a safe and friendly home environment which is conducive for their learning;

(d)   Keep track of the child's progress in behaviour;

(e)   Ensure that the child is safe while at home;

(f)   Give the child all necessary materials required in the learning process; and

(g)   Instill in the child a sense of commitment and positive value towards education and work.

7.0 Teaching and Learning Methods

The teaching and learning methods are instrumental in developing student's competences. This syllabus suggests teaching and learning methods for each activity which includes but not limited to discussions, presentations, field visits, practical work, research, scientific experiments, and project works. However, a teacher is advised to plan and use other appropriate methods based on the environment or context. All the teaching and learning methods should be integrated with the everyday lives of students.

8.0 Learning and Teaching Resources

The process of teaching and learning requires different resources. In that regard, both the teacher and students should work together to collect or improvise alternative resources available in the school and home environment when needed. The teacher and student are expected to constantly seek for information from various sources to effectively facilitate teaching and learning process. The list of approved textbooks and reference books shall be provided by TIE.

9.0 Assessment

Assessment is important in teaching and learning of Mathematics subject. It is divided into formative and summative assessments. Formative assessment informs both the teacher and students on the progress of teaching and learning, and in making decisions on improving the teaching and learning process. Teachers are, therefore, expected to apply a wide range of formative assessment methods which include but not limited to discussions, presentations, oral questions, experiments, observations, practical and projects.

Summative assessment, on the other hand, will focus on determining student's achievement of learning. Teachers are expected to use a variety of summative assessments including mid-term tests, terminal, mock examinations and projects. The scores obtained from these assessments will be used as Continuous Assessment (CA). Therefore, the continuous assessments shall contribute 30% and the National Form IV Examination shall be 70% of the student's final achievement, as indicated in Table 2.

Table 2: *Contribution of Continuous Assessment and National Examination in the final score*

Assessment measures	Weight (%)
Standard Six National Assessment	7.5
Form Two National Assessment	7.5
Form Three Annual Examination	5
Project	5
Form Four Mock Examination	5
Form Four National Examination	70
Total	**100**

10.0   Number of Periods

The Mathematics Syllabus for Ordinary Secondary Education Form I-IV provides estimates of the time that will be spent in teaching and learning, in consideration of the complexity of the specific competences and the learning activities. Five periods of 40 minutes each have been allocated for this subject per week.

11.0   Teaching and Learning Contents

The content of this syllabus is presented in matrix form with seven columns which include main competences, specific competences, learning activities, suggested methods, assessment criteria, suggested resources, and number of periods as presented in Tables 3 - 6.

Form I

Table 3: *Detailed Contents for Form I*

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
1.0 Demonstrate mastery of mathematical language	1.1 Use numerical skills in different contexts	(a) Explain the basic concepts of Mathematics (*Meaning of mathematics, branches of mathematics, relationship between mathematics and other subjects, importance of mathematics*)	**Group discussion:** Guide students to discuss meaning of mathematics and branches of mathematics **Brainstorming:** Guide students to brainstorm on importance of mathematics in daily life **Jigsaw:** Guide students to explain the relationship of mathematics with other disciplines	The basic concept of mathematics are clearly explained	Charts of relationships between mathematics and other fields, real life objects, Math Games and Apps, Educational channels	30

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Explain the concept of rational, irrational, and real numbers	**Observation:** Provide students with visual aids like bars/strips or circles and guide them to cut the aids in small equal parts. Relate their responses to the meaning of fractions **Problem solving:** Organise students in manageable groups and assign each group word problems that require students to apply their knowledge of fractions, decimals and percentages to real word scenarios. Guide them to present the results and relate their findings with rational numbers **Exploration:** Guide students to relate real numbers to real-life situations, for example, money and measurement	Rational, irrational, and real numbers are well explained	Calculator, Charts of real numbers, ruler, tape measure, graph papers, number line chart	

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Convert repeating/ recurring decimals into fractions and vice versa	**Problem solving:** Provide students with examples of decimals and guide them to identify repeating/recurring decimals, and convert repeating/ recurring decimals into fractions and vice versa and share with the rest of the class through presentations	Repeating/ recurring decimals are correctly converted into fractions	Calculator, Charts of real numbers, ruler, tape measure, graph papers	
		(c) Represent rational numbers on a number line	**Group discussion:** Organise students in manageable groups to draw number lines. Guide them to discuss steps of representing rational numbers on a number line and share their results with the rest of the class through presentations **Problem solving:** Guide students to suggest real-life problems involving rational numbers. Ask them to locate points on the number line and perform calculations based on the given scenario	Rational numbers are well represented on the number line		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(d) Explain the concept of inequalities and absolute values of real numbers	**Intuitive approach:** Guide students visual aids such as number line charts and graphing tools to explore the basic concepts of inequalities and absolute values of real numbers.	Absolute values and inequalities in real numbers are properly determined		
		(e) Describe the importance of numbers in real-life situations	**Brainstorming:** Guide the students to describe the importance of numbers and apply numbers in real-life situations	Importance of numbers are well described		
	1.2 Use ratios and proportions in daily life	(a) Explain the concept of ratios and proportions	**Group discussion**: Organise students in manageable groups to discuss and come up with real-life scenarios involving the concept of ratios and proportions. Share with the rest of the class through presentations **Jigsaw:** Guide students to explore how other subjects relate to concept of ratios and proportions	Ratios and proportions are clearly explained	Money, charts of real-life scenarios, interest calculators, and games real objects, and bank statements	36

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Solve ratio and proportion problems	**Think-ink-pair-share:** Guide students to solve ratio and proportion problems and share the results with classmates	Problems on ratios and proportions are correctly solved	Calculator, Charts of real numbers, ruler, tape measure, graph papers, number line chart	
2.0 Demonstrate mastery of basic concepts in geometry and algebra	2.1 Use geometry, approximations, relations and functions in various contexts	(a) Explain the concept of approximations *(rounding off, significant figures, and decimal places)*	**Brainstorming:** In manageable groups guide Students to explore the concept of approximations and share their findings with other groups. **Think-ink-pair-share:** Guide students to pair up to discuss their ideas, thereafter, some of the pairs share their ideas with the whole class	Approximations are clearly explained	Charts of a number line, estimation jars, estimation games and applications	34

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Round off numbers and estimate values of expressions	**Group discussion**: In manageable groups, guide students to round off numbers and estimate values of expressions and share their findings	Numbers are rounded off and values of expressions are correctly estimated		
		(c) Approximate numbers to the required significant figures and decimal places	**Jigsaw:** Guide students to use real-life examples to approximate numbers to the required significant figures and decimal places **Problem solving:** Assess the accuracy of answers provided by students when approximating numbers and provide them with feedback	Numbers are approximated to required significant figures and decimal places correctly		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(d) Use approximations in computations and measurements of quantities in various contexts	**Jigsaw:** Organise students in manageable groups to discover the use of approximations in computations and measurements of quantities in various contexts	Approximations are correctly applied in computations and measurements.		
	2.2 Use algebra and matrices in problem solving	(a) Explore the basic tenets of algebra (*algebraic expressions and equations, linear simultaneous equations of two unknowns, inequalities in one unknown*)	**Group discussion:** Organize students in manageable groups, guide them to discuss algebraic expressions and equations **Visual representations:** Provide learners with visual aids such as diagrams, charts, and graphs to illustrate the graphs of linear equations	The basic tenets of algebra are correctly explored	Beam balance, mathematical software such as MATLAB, and GeoGebra, real objects, Algebra animations	45

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Use algebraic expressions to model situations (*word problems into algebraic expressions and equations*)	**Problem solving:** Incorporate word problems that require students to translate verbal descriptions into algebraic expressions and equations. Guide them to identify key words that indicate mathematical operations	Algebraic expressions are applied to model situations correctly	Beam balance, mathematical software such as MATLAB, and GeoGebra, real objects, Algebra animations	
		(c) Solve simultaneous equations using substitution and elimination methods	**Think-ink-pair-share:** Guide students in pair to solve simultaneous equations using substitution and elimination methods Thereafter, allow some of the pairs to share their results with the whole class	Simultaneous linear equations are solved correctly		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(d) Solve inequalities in one unknown	**Group discussion:** In manageable groups, guide the students to solve inequalities in one unknown and present results for common understanding	Inequalities are solved properly	Number line chart, graphing calculator, real objects	
3.0 Demonstrate mastery of basic concepts in coordinate geometry, trigonometry, circles, vectors, probability and statistics	3.1 Use basic coordinate geometry, trigonometry and vectors skills in daily life	(a) Explore the basic tenets of coordinate geometry (*gradient and equations of a straight line, graphs of linear equations*)	**Collaborative learning:** Guide students to use visual aids, such as graphs and coordinate planes to establish the relationship between coordinates and geometrical shapes	Basic tenets of coordinate geometry are explored	Mathematical software such as MATLAB, and GeoGebra, Maple, Mathematica, graph papers	30
		(b) Find the gradient/ slope of a line	**Problem solving:** In manageable groups, guide the students to determine the slope of a given line	Gradient of line is found properly		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(c) Determine the equation of a straight line and draw its graph	**Visual representation**: Utilize visual aids like diagrams and charts to illustrate the concept of a straight line visually. Provide examples of different types of straight lines and their corresponding equations and draw their graphs	Equation of straight line is determined and its graph is properly drawn		
		(d) Solve linear simultaneous equations graphically	**Visual representation**: Guide students to use visual aids such as a coordinate plane, graph paper, or interactive whiteboard to plot points, draw lines, and interpret the graph **Group discussion:** In manageable groups, guide the students to solve linear simultaneous equations graphically	Simultaneous equations are correctly solved graphically		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(e) Use mathematical software to solve and draw graphs of simultaneous equations	**Use of technology:** Guide students to use mathematical software such as Excel, GeoGebra, Mathematica, MATLAB to solve and draw graphs of simultaneous equations. **Problem solving:** In manageable groups, provide students with plenty examples and exercise to solve and draw graphs of simultaneous equations using mathematical software	Simultaneous equations are solved and drawn correctly		

Form II

Table 4: *Detailed Contents for Form II*

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
1.0 Demonstrate mastery of mathematical language	1.1 Use rates and variations in different contexts	(a) Describe the concepts of rates and variations	**Exploration:** Organise students in manageable groups and guide them to explore real-life problems related to the concepts of rates and variations	Concepts of rates and variations are well described	Mathematical sets, marker pens, calculators, charts of real life scenarios, graph papers, rates and variation animations	11
		(b) Solve problems on rates and variations	**Group discussion:** In manageable groups, guide students to solve problems involving rates and variations	Problems on rates and variations are correctly solved		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
2.0 Demonstrate mastery of basic concepts in geometry and algebra	2.1 Use geometry, approximations, relations and functions in various contexts	(a) Describe the concepts of geometry (*similarities and congruence*)	**Exploration:** Guide the students to explore shapes and identify congruent and similar figures through direct comparison **Group discussion** In manageable groups, guide students to discuss the concepts of similarities and congruences through hands-on activities that involve physical manipulatives, such as pattern blocks, tangrams or geoboards	Concepts of geometry are well described	Mathematical sets, marker pens, calculators, graph papers, geometrical figures animations, congruence and similarities simulations	42
		(b) Recognize properties of similar triangles	**Visual representation:** Guide students to use pictures, charts, diagrams, and models to recognize properties of similar triangles	Properties of similar triangles are clearly recognized		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
			Jigsaw: Guide students to constructs and manipulate similar and congruent triangles and associate them to real-life applications			
			Exploration: Guide students to connect similar triangles to real world applications			
		(c) Explain postulates, proofs, and theorems of congruent triangles	**Group discussion**: Guide students to discuss postulates, proofs, and theorems of congruent triangles	Postulates, proofs, and theorems of congruent triangles are clearly explained		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
	2.2 Use algebra and matrices in problem solving	(a) Explore the basic tenets of algebra (*binary operations, quadratic expressions and equations, radicals, exponents, and logarithms*)	**Jigsaw:** Organise students in manageable groups to discuss the concepts of algebra (binary operations, quadratic expressions and equations, radicals, exponents, and logarithms) **Graphical methods:** Organize students in manageable groups and guide them to use graphs to solve quadratic equations **Use of technology:** Guide students to use technology such as Excel, GeoGebra, Microsoft Mathematics, and MATLAB to solve quadratic equations **Problems solving:** In manageable groups, guide students to apply binary operations to simplify quadratic expressions	Basic tenets of algebra are explored correctly	Mathematical sets, marker pens, calculators, Mathematical software such as GeoGebra, MATLAB, Maple, Mathematica, graphing calculators	68

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Solve quadratic equations by using different methods *(factorisation, Completing the square, and quadratic formula)*	**Group discussion:** Guide students through solving quadratic equations by using factorisation, completing the square, and quadratic formula	Quadratic equations are solved correctly		
		(c) Identify and use laws of exponents involving positive, negative, and zero exponents (*multiplication* law, division law, power *law, and zero index*)	**Group discussion:** In manageable groups, guide students to identify and discuss multiplication law, division law, power law, and zero index **Problem solving:** Guide students to discuss and use laws of exponents involving positive, negative, and zero exponents to simplify and solve exponential equations	Laws of exponents are clearly identified and used correctly	Exponent games and applications, exponent puzzles, exponent rule posters, visual aids, exponent animations	

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(d) Write numbers in standard form	**Group discussion:** In manageable groups, guide students to discuss and write numbers in standard form	Numbers are correctly written in standard form	Calculators, number charts, exponent games and applications, exponent puzzles, exponent rule posters, visual aids, exponent animations	
		(e) Use laws of logarithms to solve problems	**Interactive discussion:** Guide students to discuss and use laws of logarithms to solve problems involving logarithms	Laws of logarithms are used to solve problems correctly		
		(f) Perform operations on radicals and rationalize the denominators	**Problem solving:** Guide students to discuss and perform operations on radicals and rationalize the denominators	Operations on radicals and denominators are clearly performed		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
	2.3 Use sets, sequences and series in problem solving	(a) Explore the basic tenets of sets (*types of sets, subsets, operation with sets, and Venn diagrams of two sets*)	**Exploration:** Organise students in manageable groups to explore the concepts of sets, subsets, operations of sets, and Venn diagram of two sets **Jigsaw:** Organise students in manageable groups to illustrate concepts of sets, subsets, operations of sets, and Venn diagrams of two sets using real-life examples	Basic tenets of sets are clearly explored	Real objects, set simulations, charts of different sets, playing cards, coloured chalks	24
		(b) Distinguish among different types of sets (*universal set, equal sets, empty/null set, finite and infinite sets, equivalent sets, and disjoint sets*)	**Group discussion:** Organise students in manageable groups to discuss the different types of sets	Different types of sets are clearly distinguished		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(c) Compare sets (*subsets and universal sets*)	**Group discussion:** Organise students in manageable groups to compare subsets and universal sets	Sets are clearly compared	Real objects, set simulations, charts of different sets, playing cards, coloured chalks	
		(d) Perform operations with sets (*union, intersection, and complement of a set*)	**Group discussion:** Organise students in manageable groups to perform operations with sets	Operations with sets are correctly performed		
		(e) Represent two sets in a Venn diagram	**Visual representation:** Guide students to use charts and tables to represent two sets in a Venn diagram	Sets in a Venn diagram are correctly represented		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(f) Find the number of elements in a set	**Group discussion:** Organise students in manageable groups to discuss and determine the number of elements in a set	Number of elements in a set are correctly found		
3.0 Demonstrate mastery of basic concepts in coordinate geometry, trigonometry, circles, vectors, probability, and statistics	3.1 Use basic coordinate geometry, trigonometry and vectors skills in daily life	(a) Explore the basic tenets of trigonometry (*trigonometric ratios, angles of elevation and depression*)	**Exploration:** Organise students in manageable groups to explore the concepts of trigonometric ratios, angles of elevation and depression using real-life examples	The basic tenets of trigonometry are clearly explored	Geometry animations, Mathematical software such as GeoGebra, MATLAB, Maple, Mathematica, graph paper, mathematical set	30

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Determine trigonometric ratios of angles and special angles	**Group discussion:** In manageable groups, guide students to discuss and determine trigonometric ratios of angles and special angles	Trigonometric ratios of angles and special angles are clearly determined		
		(c) Calculate angles of elevation and depression	**Jigsaw:** Organise students in manageable groups to discuss and calculate angles of elevation and depression	Angles of elevation and depression are calculated correctly		

Form III

Table 5: *Detailed Contents for Form III*

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
1.0 Demonstrate mastery of basic concepts in geometry and algebra	1.1 Use geometry, approximations, relations and functions in various contexts	(a) Describe the concepts of relations and functions (linear and quadratic) (*types of relations, domain and range of relations, graphs of relations and functions, inverse of relations, and functions*)	**Collaborative learning:** Organise students in manageable groups to discuss the concepts of relations, functions, types of relations and functions, and link between relations and functions **Exploration:** Organise students in manageable groups to explore the concept of relations of family members and price of different commodities in different businesses	Concepts of relations and functions are clearly described	Function animation, graph boards and papers, calculators, charts of real life scenarios Mathematical software such as Mathematica, GeoGebra	58

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
			Visual representation: Guide students to use graphs, charts, and tables to discuss mappings of two sets **Project:** In small groups, guide students to visit nearby shops and relate prices of different commodities with the concept of domain and range of functions			
		(b) Find the domain and range of relations and functions	**Jigsaw:** Organise students in manageable groups and guide them to determine domain and range from graphs, charts, and tables of relations and functions	Domain and range of relations and functions are clearly described		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(c) Find the inverses of relations and functions	**Problem solving:** Equip students with appropriate materials on relations and functions. Guide them to discuss the provided questions on inverses of relations and functions and present their findings	The inverse of relations and functions are correctly found		
		(d) Draw graphs of relations and functions	**Visual representation:** In manageable groups guide students to use visual aid to draw graphs of relations and functions **Use of technology**: Guide students to use technology such as graphing calculators, and software such as MATLAB to draw graphs of relations and functions	The graphs of relations and functions are correctly drawn		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
	1.2 Use algebra and matrices in problem solving	Explore the basic tenets of algebra (*linear programming: constraints, objective functions, and optimal solution*)	**Jigsaw:** Organise students in manageable groups to discuss the concepts of linear programming, constraints, objective functions, and optimal solutions of linear programming using real-life examples **Graphical methods:** In manageable groups, guide students to use graphs to determine optimal solutions of linear programming problems with two variables **Use of technology**: Guide students to use technology such as Excel and MATLAB to determine the optimal solutions of linear programming problems with two variables **Problems solving:** In manageable groups, guide students to find optimal solutions of linear programming problems	The concepts of linear programming are clearly explored	Function animation, graph boards and papers, calculators, charts of real life scenarios Mathematical software such as Mathematica, GeoGebra	78

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
	1.3 Use sets, sequences and series in problem solving	(a) Explore the basic tenets of sequences and series (*Arithmetic progression AP, Geometric progression GP*)	**Exploration:** Guide students to explore the concepts of sequences and series **Visual representation:** Guide students to use visual aids such as charts, diagrams, graphs, and real objects to discuss the concepts of Arithmetic Progression (AP) and Geometric Progression (GP)	The concepts of sequences and series are clearly explored	Pattern puzzles, pattern blocks, visual aids, sequence and series games and applications, calculators,	58
		(b) Find the general term for AP and GP and use them to derive formulae for the sums of APs and GPs	**Exploration:** Organise students in manageable groups to discover and derive the nth terms of AP and GP **Group discussion:** In manageable groups, guide students to determine the nth terms of APs and GPs	The formulae for the sum of APs and GPs are correctly derived		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(c) Calculate arithmetic mean, geometric mean, and compound interest	**Exploration:** Organise students in manageable groups to explore the concepts of arithmetic mean, geometric mean, and compound interest **Think-ink-pair-share:** In manageable groups, instruct students to discuss and apply the concepts of arithmetic mean, geometric mean, and compound interest in their real-life situation **Interactive discussion:** Guide students to apply the concept of compound interest in real-life situations, such as calculating the total cost of loan or the return on an investment over time	The arithmetic mean, geometric mean, and compound interest are correctly found		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
2.0 Demonstrate mastery of basic concepts in coordinate geometry, trigonometry, circles, vectors, probability and statistics	2.1 Use basic skills of circles in daily life	Explore the basic tenets of a circle (*angle properties, theorems, tangents, chords and radians*)	**Think- ink-pair-share:** Organise students in manageable groups to discuss the concepts of angle properties of a circle, tangent, theorems, chords, and radians **Scenario:** Provide a scenario that shows the application of circles. Allow learners to discuss, make follow up and provide feedback **Visual representation:** Guide students to use visual aids such as diagrams, pictures, and animations to understand the concepts of angle properties of a circle, tangent, theorems, chords, and radians	The concept of circle is clearly explored	Charts of circle theorems, circle theorems animations, circle simulations, mathematical sets, visual aids, Mathematical software such as GeoGebra,	39

Form IV

Table 6: *Detailed Contents for Form IV*

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
1.0 Demonstrate mastery of basic concepts in geometry and algebra	1.1 Use algebra and matrices in problem solving	(a) Explore the basic tenets of matrices (2×2 *matrices: operations, determinant, inverse, and transformations*)	**Demonstration:** Demonstrate the concept of matrices using real-life examples **Visual representation**: Guide students to use graphs, charts, and tables to explain the concept of matrices	The basic tenets of algebra are explored clearly	Visual aids, Coloured blocks, matrix calculators, charts of real life scenarios, graphing calculators	40
		(b) Apply matrices to solve simultaneous equations of two unknowns *(matrix inversion method and Cramer's rule)*	**Questions and answers:** Organise students in manageable groups to determine the solution of simultaneous equations of two unknowns using matrix inversion method and Cramer's rule	Matrices are clearly applied to solve simultaneous equations of two unknowns		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
			Use of technology: Guide students to use technology such as graphing calculators, and software such as Excel, Microsoft Mathematics, and MATLAB to determine the solutions of simultaneous equations with two unknowns using matrix inversion method and Cramer's rule			
			Problem solving: In manageable groups, provide students with examples to practice basic operations on matrices, determinants, inverses, and transformations on matrices			

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
2.0 Demonstrate mastery of basic concepts in coordinate geometry, trigonometry, circles, vectors, probability, and statistics	2.1 Use basic coordinate geometry, trigonometry, and vectors skills in daily life	(a) Explore the basic tenets of coordinate geometry (*midpoint of a line segment, distance between two points on a line, parallel, and perpendicular lines*)	**Demonstration:** Demonstrate the concepts of midpoint of a line segment, distance between two points on a line, parallel lines, and perpendicular lines using real-life problems **Problem solving:** Organise students in manageable groups to use real world examples to find the midpoint of a line segment, distance between two points on a line, parallel, and perpendicular lines **Visual representation:** Guide students to use graphs, charts, and real objects to explain the concepts of midpoint of a line segment, distance between two points on a line, parallel lines, and perpendicular lines	The basic tenets of coordinate geometry are well explored	Graph papers, mathematical sets, graph boards/papers, geometry animation, Mathematical software such as GeoGebra, Mathematica, MATLAB, Maple	88

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Apply sine and cosine rules to find distances or angles of elevation	**Exploration:** Guide students to explore the application of sine and cosine rules in finding distances or angles of elevation **Use of technology:** Guide students to use technology such as graphing calculators, and software such as Excel and MATLAB to apply sine and cosine rules to find distances or angles of elevation **Problem solving:** In manageable groups, provide students with questions to practice on how to apply the sine and cosine rules to determine the distance or angles of elevation	The sine and cosine rules are clearly applied to find distances and angles of elevation		
		(c) Derive and use compound angles to solve problems	**Group discussion:** Organise students in manageable groups to derive and use compound angles to solve problems **Use of technology:** Guide students to use technology such as graphing calculators and compound angles to solve problems **Jigsaw:** In manageable groups, provide students with assignment to solve problems	The compound angles are clearly derived and used to solve problems		

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
		(d) Explore the basic tenets of vectors (*displacement and position vectors, magnitude and direction, sum and differences, multiplication of vectors by a scalar*)	**Exploration:** Encourage students individually or in groups to explore the basic tenets of vectors through visual representations, problem solving and its applications in real life			
	2.2 Use probability in problem solving	Explore the basic tenets of probability of two events (*probability of an event, mutually exclusive events, dependent events, combined events using tree diagrams, tables and formulae*)	**Visual representation:** Use interactive tools to demonstrate concept of probability of an event **Group discussion:** Guide students in manageable groups to discuss and determine probability of an event, dependent event, combined events using tree diagram, tables and formulae	The basic tenets of probability are well explored	Probability games, probability simulations, charts of real life situations, probability games, probability trees and diagram	22

Main competences	Specific competences	Learning activities	Suggested teaching and learning methods	Assessment criteria	Suggested resources	Number of periods
	2.3 Use statistics in problem solving	Explore the basic tenets of statistics (*frequency distribution, measures of central tendency, histogram, frequency polygon, and cumulative frequency curve 'ogive'*)	**Demonstration:** Using real-life examples, guide the students to describe and demonstrate the concepts of frequency distribution and measure of central tendency **Group discussion:** Guide students in manageable groups to discuss and determine the measures of central tendency, draw histogram, frequency polygon and cumulative frequency curve (ogive) **Exploration:** Guide students in groups to explore the basic tenets of statistics through the use of technology, visual aids such as charts of data and graphs of real life scenarios	The basic tenets of statistics are explored clearly	Statistical calculators, statistical charts and graphs, graph paper, real-life case studies charts, data visualisation tools calculators, mathematical sets, chalks, graph boards/ papers, and other relevant resources	25

Bibliography

Curriculum Development and Technical Services. (2015). *Mathematics Syllabus Forms 1-4*. Ministry of Primary and Secondary Education.

Curriculum Planning and Development Division. (2019). *Mathematics Syllabuses Secondary One to Four Express Course Normal (Academic) Course.*

Mauritius Institute of Education. (2017). *Nine-Year Continuous Basic Education Syllabus Grades 7, 8 and 9*. Mauritius Institute of Education

MOE & UCLES. (2020). *Singapore–Cambridge General Certificate of Education Ordinary Level (2022), Mathematics (Syllabus 4048)*. MOE & UCLES

Rwanda Education Board. (2015). *Mathematics Syllabus for Ordinary Level S1-S3*. Ministry of Education.

Tanzania Institute of Education. (2005). *Basic Mathematics Syllabus for Ordinary Secondary Education Form 1-IV*. Ministry of Education and Vocational Training.

Tanzania Institute of Education. (2021). *Basic Mathematics for Secondary Schools Student's Book Form One*. Tanzania Institute of Education.

Tanzania Institute of Education. (2021). *Basic Mathematics for Secondary Schools Student's Book Form Two*. Tanzania Institute of Education.

Tanzania Institute of Education. (2021). *Basic Mathematics for Secondary Schools Student's Book Form Three*. Tanzania Institute of Education.

Tanzania Institute of Education. (2021). *Basic Mathematics for Secondary Schools Student's Book Form Four*. Tanzania Institute of Education.

University of Cambridge Local Examination Syndicate. (2019). *Cambridge O Level Mathematics (Syllabus D) 4024, Cambridge assessment international education*. University of Cambridge.