REPUBLIC OF KENYA

MINISTRY OF EDUCATION

JUNIOR SECONDARY SCHOOL CURRICULUM DESIGN

GRADE 8

MATHEMATICS

KENYA INSTITUTE OF CURRICULUM DEVELOPMENT

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FOREWORD

The Government of Kenya is committed to ensuring that policy objectives for Education, Training and Research meet the aspirations of the Kenya Constitution 2010, the Kenya Vision 2030, National Curriculum Policy 2019, the United Nations Sustainable Development Goals (SDGs) and the Regional and Global conventions to which Kenya is a signatory. Towards achieving the mission of Basic Education, the Ministry of Education (MoE) has successfully and progressively rolled out the implementation of the Competency Based Curriculum (CBC) at Pre-Primary and Primary School levels. The roll out of Junior Secondary School (Grade 7-9) will subsequently follow as from 2023-2025.

The Grade 8 curriculum designs build on competencies attained by learners at the end of Grade 7. Further, they provide opportunities for learners to continue exploring and nurturing their potentials as they prepare to transit to Senior Secondary School.

The curriculum designs present National Goals of Education, essence statements, general and specific expected learning outcomes for the learning areas (subjects) as well as strands and sub strands. The designs also outline suggested learning experiences, key inquiry questions, core competencies, Pertinent and Contemporary Issues (PCIs), values, Community Service Learning (CSL) activities and assessment rubric.

It is my hope that all Government agencies and other stakeholders in Education will use the designs to plan for effective and efficient implementation of the CBC.

PROF. GEORGE A. O. MAGOHA, EGH
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PREFACE

The Ministry of Education (MoE) is implementing the second phase of the curriculum reforms with the national roll out of the Competency Based Curriculum (CBC) having been implemented in 2019. Grade 8 is the second level of the Junior Secondary School (JSS) in the new education structure.

Grade 8 curriculum furthers implementation of the CBC from Grade 7. The main feature of this level is a broad curriculum for the learner to explore talents, interests and abilities before selection of pathways and tracks at the Senior Secondary education level. This is very critical in the realisation of the Vision and Mission of the on-going curriculum reforms as enshrined in the Sessional Paper No. I of 2019 whose title is: *Towards Realizing Quality, Relevant and Inclusive Education and Training for Sustainable Development* in Kenya. The Sessional Paper explains the shift from a Content - Focused Curriculum to a focus on **Nurturing every Learner's potential.**

Therefore, the Grade 8 curriculum designs are intended to enhance the learners' development in the CBC core competencies, namely: Communication and Collaboration, Critical Thinking and Problem Solving, Creativity and Imagination, Citizenship, Digital Literacy, Learning to Learn and Self-efficacy.

The curriculum designs provide suggestions for interactive and differentiated learning experiences linked to the various sub strands and the other aspects of the CBC. The curriculum designs also offer several suggested learning resources and a variety of assessment techniques. It is expected that the designs will guide teachers to effectively facilitate learners to attain the expected learning outcomes for Grade 8 and prepare them for smooth transition to the next Grade. Furthermore, it is my hope that teachers will use the designs to make learning interesting, exciting and enjoyable.

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ACKNOWLEDGEMENT

The Kenya Institute of Curriculum Development (KICD) Act Number 4 of 2013 (Revised 2019) mandates the Institute to develop curricula and curriculum support materials for basic and tertiary education and training. The curriculum development process for any level of education involves thorough research, international benchmarking and robust stakeholder engagement. Through a systematic and consultative process, the KICD conceptualised the Competency Based Curriculum (CBC) as captured in the *Basic Education Curriculum Framework* (BECF), that responds to the demands of the 21st Century and the aspirations captured in the Kenya Constitution 2010, the Kenya Vision 2030, East African Community Protocol and the United Nations Sustainable Development Goals (SDGs).

KICD receives its funding from the Government of Kenya to enable the successful achievement of the stipulated mandate and implementation of the Government and Sector (Ministry of Education (MoE) plans. The Institute also receives support from development partners targeting specific programmes. The Grade 8 curriculum designs have been developed with the support of the World Bank through the Kenya Secondary Education Quality Improvement Program (SEQIP) commissioned by the MoE. Therefore, the Institute is very grateful for the support of the Government of Kenya, through the MoE and the development partners for the policy, resource and logistical support. Specifically, special thanks to the Cabinet Secretary – MoE and the Principal Secretary – State Department of Early Learning and Basic Education,

We also wish to acknowledge the KICD curriculum developers and other staff, all teachers, educators who took part as panelists; the Semi-Autonomous Government Agencies (SAGAs) and representatives of various stakeholders for their roles in the development of the Grade 8 curriculum designs. In relation to this, we acknowledge the support of the –Chief Executive Officers of the Teachers Service Commission (TSC) and the Kenya National Examinations Council (KNEC) for their support in the process of developing these designs.

Finally, we are very grateful to the KICD Council Chairperson Prof. Elishiba Kimani and other members of the Council for very consistent guidance in the process. We assure all teachers, parents and other stakeholders that these curriculum designs will effectively guide the implementation of the CBC at Grade 8 and preparation of learners for Grade 9.

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LESSON ALLOCATION

No	Subject	Number of Lessons Per Week (40 minutes per lesson)
	English	5
	Kiswahili/KSL	4
	Mathematics	5
	Integrated Science	4
	Health Education	2
	Pre-Technical Studies	4
	Social Studies	3
	Religious Education	3
	Business Studies	3
	Agriculture	3
	Life Skills Education	1
	Physical Education and Sports	2
	Optional Subject	3
	Optional Subject	3
	Total	**45**

NATIONAL GOALS OF EDUCATION

Education in Kenya should:

i) **Foster nationalism and patriotism and promote national unity.**
Kenya's people belong to different communities, races and religions, but these differences need not divide them. They must be able to live and interact as Kenyans. It is a paramount duty of education to help young people acquire this sense of nationhood by removing conflicts and promoting positive attitudes of mutual respect which enable them to live together in harmony and foster patriotism in order to make a positive contribution to the life of the nation.

ii) **Promote the social, economic, technological and industrial needs for national development.**
Education should prepare the youth of the country to play an effective and productive role in the life of the nation.

a) Social Needs
Education in Kenya must prepare children for changes in attitudes and relationships which are necessary for the smooth progress of a rapidly developing modern economy. There is bound to be a silent social revolution following in the wake of rapid modernization. Education should assist our youth to adapt to this change.

b) Economic Needs
Education in Kenya should produce citizens with the skills, knowledge, expertise and personal qualities that are required to support a growing economy. Kenya is building up a modern and independent economy which is in need of an adequate and relevant domestic workforce.

c) Technological and Industrial Needs
Education in Kenya should provide learners with the necessary skills and attitudes for industrial development. Kenya recognizes the rapid industrial and technological changes taking place, especially in the developed world. We can only be part of this development if our education system is deliberately focused on the knowledge, skills and attitudes that will prepare our young people for these changing global trends.

iii) **Promote individual development and self-fulfillment**
Education should provide opportunities for the fullest development of individual talents and personality. It should help children to develop their potential interests and abilities. A vital aspect of individual development is the building of character.

iv) **Promote sound moral and religious values.**
Education should provide for the development of knowledge, skills and attitudes that will enhance the acquisition of sound moral values and help children to grow up into self-disciplined, self-reliant and integrated citizens.

v) **Promote social equality and responsibility.**
Education should promote social equality and foster a sense of social responsibility within an education system which provides equal educational opportunities for all. It should give all children varied and challenging opportunities for collective activities and corporate social service irrespective of gender, ability or geographical environment.

vi) **Promote respect for and development of Kenya's rich and varied cultures.**
Education should instill in the youth of Kenya an understanding of past and present cultures and their valid place in contemporary society. Children should be able to blend the best of traditional values with the changing requirements that must follow rapid development in order to build a stable and modern society.

vii) **Promote international consciousness and foster positive attitudes towards other nations.**
Kenya is part of the international community. It is part of the complicated and interdependent network of peoples and nations. Education should therefore lead the youth of the country to accept membership of this international community with all the obligations and responsibilities, rights and benefits that this membership entails.

viii) **Promote positive attitudes towards good health and environmental protection.**
Education should inculcate in young people the value of good health in order for them to avoid indulging in activities that will lead to physical or mental ill health. It should foster positive attitudes towards environmental development and conservation. It should lead the youth of Kenya to appreciate the need for a healthy environment.

LEARNING OUTCOMES FOR MIDDLE SCHOOL

By end of Middle School, the learner should be able to:

1. Apply literacy, numeracy and logical thinking skills for appropriate self-expression.
2. Communicate effectively, verbally and non-verbally, in diverse contexts.
3. Demonstrate social skills, spiritual and moral values for peaceful co-existence.
4. Explore, manipulate, manage and conserve the environment effectively for learning and sustainable development.
5. Practise relevant hygiene, sanitation and nutrition skills to promote health.
6. Demonstrate ethical behaviour and exhibit good citizenship as a civic responsibility.
7. Appreciate the country's rich and diverse cultural heritage for harmonious co-existence.
8. Manage pertinent and contemporary issues in society effectively.
9. Apply digital literacy skills for communication and learning.

ESSENCE STATEMENT

We live in a world of Mathematics whereby we count, add, subtract, multiply or divide quantities and substances throughout our daily interactions. Mathematics involves understanding numbers and the numerical operations used to develop strategies for mental mathematical problem solving skills, estimation and computational fluency. We live in a world of space, shape and structures. It is impossible to think of a world without Mathematics. It is applied in the economic activities, scientific, social, religious and political worlds. It is therefore imperative that children are taught Mathematics from early years.

In Junior Secondary, Mathematics builds on the competencies acquired by the learner from primary school. It enhances the learner's competencies in mathematical skills as a foundation for Science, Technology, Engineering and Mathematics (STEM) and other pathways at Senior School. Mathematics also prepares the learner to have sufficient skills and competencies for application in solving problems in real life situations. This is in line with vision 2030 and sessional paper number 1 of 2019 which emphasizes on STEM areas.

SUBJECT GENERAL LEARNING OUTCOMES

By the end of the Junior Secondary, the learner should be able to:

1. Demonstrate mastery of number concepts by working out problems in day to day life
2. Represent and apply algebraic expressions in different ways
3. Apply measurement skills to find solutions to problems in a variety of contexts
4. Use money and carry out financial transactions in real life situations
5. Generate geometrical shapes and describe spatial relationships in different contexts
6. Collect and organize data to inform and solve problems in real life situations
7. Develop logical thinking, reasoning, communication and application skills through a mathematical approach to problem solving
8. Apply mathematical ideas and concepts to other learning areas or subjects and in real life contexts.
9. Develop confidence and interest in mathematics for further training and enjoyment.

STRAND 1.0: NUMBERS

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
1.0 Numbers	**1.1 Integers** (6 lessons)	By the end of the sub-strand the learner should be able to; a) identify integers in different situations b) represent integers on a number line in different situations c) carry out operations of addition and subtraction integers on the number line in real life situations d) use IT or print resources for learning more on integers and for skills development e) reflect on use of integers in real life situations.	The learner is guided to: • carry out activities involving positive and negative numbers and zero. For example, climbing upstairs (positive), going down stairs (negative). Others may include standing at a point (the zero point) and count the number of steps moved either forward or backward. • draw and represent integers on number lines on learning materials. • perform operations, including combined operations of integers on a number line. • play creative games that involve number lines, for example jumping steps. • use IT or other resources to learn more on operations of integers on number lines.	1. Where do we use integers in real life situations? 2. How do we carry out operations of integers? 3. Where are integer operations applicable in life?

Core Competencies to be developed

- **Creativity and imagination**- creating games; as learners play creative games that involve number lines, for example jumping steps.
- **Learning to learn**; as learners represent integers on the number line.
- **Digital literacy**- interacting with technologies; as learners use IT devices to learn and play games on integers.

Values

- **Respect;** as learners work in groups to play games that involve integers.
- **Unity**; as learners work together in creating games on integers.

Pertinent and Contemporary Issues (PCIs)

- **Environmental education**; as learners use available resources and spaces to jump steps.

Links to other subjects

- **Integrated Science**; as learners work out operations that involve integers.

Suggested Rubric

Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to identify integers	Identifies integers comprehensively	Identifies integers correctly	Identifies integers inconsistently	Identifies integers with difficulties
Ability to represent integers on a number line	Represents integers on a number line systematically	Represents integers on a number line accurately	Represents integers on a number line partially	Represents integers on a number line with difficulties
Ability to carry out operations of integers on the number line	Carries out operations of integers on the number line systematically and correctly	Carries out operations of integers on the number line correctly	Carries out operations of integers on the number line partially	Carries out operations of integers on the number line with difficulties

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
1.0 Numbers	**1.2 Fractions** (6 lessons)	By the end of the sub- strand, the learner should be able to; a) carry out combined operations on fractions in different situations b) Work out operations on fractions in real life Situations c) use IT devices for learning more on fractions and for enjoyment, d) promote use of fractions in real life situations.	The learner is guided to: • discuss and use the correct order of operations in fractions. • discuss and carry out operations on fractions from activities such as shopping and other real life cases. • play games of operations on fractions using IT devices or other resources.	How do we use fractions in real life situations?
Core Competencies to be developed; • **Citizenship**; as learners discuss and use the correct order of operations in fractions in some aspects such as populations. • **Critical thinking and problem solving**; as learners work out operations on fractions from shopping activities,				
Values: • **Responsibility**; as learners play games of operations on fractions using IT devices or other resources. • **Respect**; as learners work together to work out operations on fractions from shopping activities.				
Pertinent and Contemporary Issues (PCIs) • **Self-esteem**; as learners play games of operations on fractions using IT devices or other resources.				
Links to other subjects • **Languages**; as learners discuss and use the correct order of operations in fractions.				

• **Agriculture**; as learners estimate harvests, seeds or fertilizer required for sowing or application in fractions.				
Suggested Rubric				
Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to carry out combined operations on fractions	Carries out combined operations on fractions Systematically	Carries out combined operations on fractions correctly	Carries out combined operations on fractions partially	Carries out combined operations on fractions with difficulties
Ability to work out operations on fractions	Works out operations on fractions systematically	Works out operations on fractions accurately	Works out operations on fractions partially	Works out operations on fractions with difficulties

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
1.0 Numbers	**1.3 Decimals** (8 lessons)	By the end of the sub- strand, the learner should be able to; a) convert fractions to decimals in different situations b) identify recurring decimals in different situations c) convert recurring decimals into fractions in different situations d) round off a decimal number to a required number of decimal places in different situations e) express numbers to a required significant figure in real life situations. f) express numbers in standard form in different situations g) carry out combined operations on decimals in different situations h) apply decimals to real life situations	The learner is guided to: • practice converting fractions to decimals. • discuss and classify non-recurring and recurring decimals. Indicate the recurring digits. • practice converting recurring decimals to fractions. • discuss and round off decimal numbers to a required number of decimal places • write decimal and whole numbers to a given significant figures • write numbers in standard form in learning materials such as cards or charts. • work out combined operations on decimals in the correct order.	1. How do we work out operations on decimals? 2. How do we use decimals in real life situations?

		i) use IT or other resources for learning more on decimals and for enjoyment, j) promote use of decimals in real life situations.	• discuss and apply decimals to real life cases. • play games of operations on decimals using IT or other materials.	
Core Competencies to be developed; • **Citizenship**; as learners work in groups, discuss and classify non- recurring and recurring decimals. • **Critical thinking and problem solving**; as learners practice converting recurring decimals to fractions.				
Values • **Responsibility**; as learners discuss and classify non- recurring and recurring decimals. • **Respec**t; as learners work in groups to discuss and classify non- recurring and recurring decimals.				
Pertinent and Contemporary Issues (PCIs) • **Self-esteem**; as learners work out combined operations on decimals in the correct order. • **ESD**; as learners play games of operations on decimals using IT or other materials.				
Links to other subjects • **Languages**; as learners discuss and apply decimals to real life cases. • **Integrated Science**; as learners express different quantities of measurement in Science in decimals.				

Suggested Rubric				
Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to convert fractions to decimals	Converts fractions to decimals correctly and proficiently	Converts fractions to decimals correctly	Converts fractions to decimals partially	Converts fractions to decimals with difficulties
Ability to identify recurring decimals	Identifies recurring decimals comprehensively	Identifies recurring decimals correctly	Identifies some recurring decimals	Identifies recurring decimals with difficulties
Ability to convert recurring decimals into fractions	Converts recurring decimals into fractions systematically and accurately	Converts recurring decimals into fractions accurately	Converts recurring decimals into fractions partially	Converts recurring decimals into fractions with difficulties
Ability to round off a decimal number to a required number of decimal places	Rounds off a decimal number to a required number of decimal places Precisely	Rounds off a decimal number to a required number of decimal places correctly	Rounds off decimal numbers to a required number of decimal places partially	Rounds off a decimal number to a required number of decimal places with difficulties
Ability to express numbers to a required significant figure	Expresses numbers to a required significant figure precisely	Expresses numbers to a required significant figure accurately	Expresses numbers to a required significant figure partially	Expresses numbers to required significant figure with difficulties
Ability to express numbers in standard form	Expresses numbers in standard form precisely	Expresses numbers in standard form correctly	Expresses numbers in standard form partially	Expresses numbers in standard form with difficulties

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to carry out combined operations on decimals	Carries out combined operations on decimals systematically and correctly	Carries out combined operations on decimals correctly	Carries out combined operations on decimals partially	Carry out combined operations on decimals with difficulties
Ability to apply decimals to real life situations	Applies decimals in real life situations accurately and Proficiently	Applies decimals in real life situations accurately	Applies decimals in real life situations inconsistently	Applies decimals in real life situations with difficulties

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
1.0 **Numbers**	**1.4 Squares and Square roots (6 lessons)**	By the end of the sub- strand the learner should be able to; a) work out the squares of numbers from tables in different situations b) work out the square roots of numbers from tables in different situations c) work out squares and square roots of numbers using a calculator in different situations d) use IT or other materials to learn more on squares and square roots of numbers and for fun. e) enjoy using squares and square roots in real life situations	The learner is guided to: • read and write the squares of numbers from tables • read and write the square roots of numbers from tables • practice working out squares and square roots using a calculator. • use IT devices or other materials to play square and square root games. • create games that involve squares and square roots of numbers.	1. What are squares and square roots of numbers? 2. Where do we apply squares and square roots in real life situations?

Core Competencies to be developed;

- **Communication and collaboration**- speaking and listening; as learners work in groups to read and write the square roots of numbers from tables
- **Imagination and creativity**- open mindedness and creativity; as learners read and write the square roots of numbers from tables

Values

- **Respect**; as learners appreciate each other's contribution in creating games that involve squares and square roots of numbers.
- **Unity**; as learners work in teams to play games involving squares and square roots of numbers.

Pertinent and Contemporary Issues (PCIs)

- **Life skills**; as learners use IT devices or other materials to play games on squares and square root games.
- **Environmental education**; as learners use IT devices or other materials to play square and square root games.

Links to other subjects

- **Pre-technical and** pre-career as learners apply knowledge of squares and square roots in designing items to make.

Suggested Rubric

Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to work out the squares of numbers from tables	Works out the squares of numbers from tables systematically accurately	Works out the squares of numbers from tables accurately	Works out the squares of numbers from tables partially	Works out the squares of numbers from tables with difficulties
Ability to work out the square roots of numbers from tables	Works out the square roots of numbers from tables systematically and accurately	Work out the square roots of numbers from tables accurately	Work out the square roots of numbers from tables partially	Work out the square roots of numbers from tables with difficulties
Ability to work out squares and square roots of numbers using a calculator	Works out squares and square roots of numbers using a calculator correctly and efficiently	Works out squares and square roots of numbers using a calculator correctly	Works out squares or square roots of numbers using a calculator inconsistently	Works out squares and square roots of numbers using a calculator with difficulties

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
1.0 **Numbers**	1.5 **Rates, Ratio, Proportions and Percentages** (14 lessons)	By the end of the sub- strand the learner should be able to; a) identify rates in different situations b) work out rates in real life situations c) express fractions as ratios in real life situations d) compare two or more ratios in different situations e) divide quantities in given ratios in real life situations f) work out ratios in different situations g) work out increase and decrease of quantities using ratios in real life situations h) work out percentage change of given quantities in real life situations.	The learner is guided to: • time while doing different activities such as calling using for example different mobile service providers. • role play this activity and note time taken to call, Record on a table and compare. • use cut outs from whole objects or substances to relate fractions to ratios. • discuss and compare ratios from the cut outs. • discuss and share quantities of concrete objects in different ratios. • discuss and determine percentage increase and decrease of different quantities. • use IT devices or other materials to explore percentage change.	1. How do we use rates in real life situations? 2. How do we use ratios in daily activities?

		i) identify direct and indirect proportions in real life situations j) work out direct and indirect proportions in real life situations k) use IT devices or other resources for more learning on ratios and proportions l) promote use of ratios and proportions in real life.	• role play shopping activities to show and determine direct relationships and can use any other activities. • use hourglass to show and determine indirect relationships and can use any other activities. • watch videos on ratios and proportions as used in daily activities	

Core Competencies to be developed

- **Critical thinking and problem solving-** evaluation and decision making; as learners do different activities such as calling using different service providers to determine calling rates.
- **Imagination and creativity**; as learners use hourglass to show indirect relationships.

Values

- **Respect** as learners share out different quantities in given ratios
- **Integrity** as learners share out quantities in different proportions or percentages.

Pertinent and Contemporary Issues (PCIs)

- **Social cohesion**; as learners role play time taken to call for a specified time and also charges from different telecom service providers.
- **Decision making**; as learners use ratios to divide quantities such as money on different items to buy as part of consumer awareness.

Links to other subjects

- **Business studies** as learners calculate rates of calling from service providers as part of consumer protection.
- **Home science** as learners work out ratios of ingredients in various aspects of home care eg baking.
- **Pre career** and pre tech as learners work out ratios or proportions of different building materials

Suggested Rubric

Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to identify rates	Identifies rates precisely	Identifies rates correctly	Identifies rates partially	Identifies rates with difficulties
Ability to work out rates	Works out rates correctly and proficiently	Works out rates correctly	Works out rates inconsistently	Works out rates with difficulties
Ability to express fractions as ratios	Expresses fractions as ratios Precisely	Expresses fractions as ratios accurately	Expresses fractions as ratios partially	Express fractions as ratios with difficulties
Ability to compare two or more ratios	Compares two or more ratios systematically and correctly	Compares two or more ratios correctly	Compares two or more ratios partially	Compares two or more ratios with difficulties
Ability to divide quantities in given ratios	Divides quantities in given ratios systematically and accurately	Divides quantities in given ratios accurately	Divides quantities in given ratios partially	Divides quantities in given ratios with difficulties

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to compare two or more ratios	Compares two or more ratios correctly and systematically	Compares two or more ratios correctly	Compares two or more ratios partially	Compares two or more ratios with difficulties
Work out ratios	works out ratios correctly and proficiently	Works out ratios correctly	Works out ratios inconsistently	Works out ratios with difficulties
Ability to work out increase and decrease of quantities using ratios	Works out increase and decrease of quantities using ratios systematically	Works out increase and decrease of quantities using ratios correctly	Works out increase and decrease of quantities using ratios partially	Works out increase and decrease of quantities using ratios with difficulties
Ability to work out percentage change of given quantities	works out percentage change of given quantities systematically	Works out percentage change of given quantities accurately	Works out percentage change of given quantities partially	Works out percentage change of given quantities with difficulties
Ability to identify direct and indirect proportions	Identifies and relates direct and indirect proportions precisely	Identifies direct and indirect proportions correctly	Identifies direct or indirect proportions correctly	Identifies direct and indirect proportions with difficulties
Ability to work out direct and indirect proportions	Works out direct and indirect proportions systematically	Works out direct and indirect proportions correctly	Works out direct or indirect proportions correctly	Works out direct and indirect proportions with difficulties

STRAND 2.0: ALGEBRA

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
2.0 Algebra	**2.1 Algebraic Expressions** (6 Lessons)	By the end of the sub- strand the learner should be able to; a) factorize algebraic expressions in different situations b) simplify algebraic fractions in different situations c) evaluate algebraic expressions by substituting numerical values in different situations d) use IT or other materials to learn more on algebraic expressions e) enjoy using algebraic expressions in real life situations.	The learner is guided to: • discuss and identify like and unlike terms and factorize algebraic expressions. • discuss like and unlike terms and simplify the algebraic fractions • discuss how to substitute the given numerical values to work out a given algebraic expression. • use IT to work out exercises and activities in algebra or drag and drop activities of grouping similar terms to simplify algebraic expressions • use other resources to work out algebra exercises.	1. How do we factorize algebraic expressions? 2. How do we simplify algebraic expressions?

Core Competencies to be developed;

- **Critical thinking and problem solving;** as learners discuss like and unlike terms to factorize and simplify algebra.
- **Self-efficacy** as learners use varied resources to work out algebra.

Values • **Responsibility**; as learners discuss and substitute values in algebraic expressions.
Pertinent and Contemporary Issues (PCIs) • **Environmental education**; as learners as learners use varied resources for like and unlike terms in algebra.
Links to other subjects • **Integrated Science**; as learners use symbols to represent quantities for substances.

Suggested Rubric

Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to factorize algebraic expressions	Factorises algebraic expressions systematically and correctly	Factorises algebraic expressions correctly	Factorises algebraic expressions partially	Factorises algebraic expressions with difficulties
Ability to simplify algebraic fractions	Simplifies algebraic fractions accurately and proficiently	Simplifies algebraic fractions accurately	Simplifies algebraic fractions partially	Simplifies algebraic fractions with difficulties
Ability to evaluate algebraic expressions by substituting numerical values	Evaluates algebraic expressions by substituting numerical values accurately and systematically	Evaluates algebraic expressions by substituting numerical values accurately	Evaluates algebraic expressions by substituting numerical values partially	Evaluates algebraic expressions by substituting numerical values with difficulties

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
2.0 **Algebra**	2.2 **Linear Equations** (7 Lessons)	By the end of the sub strand the learner should be able to; a) form linear equations in two unknowns in real life situations b) solve linear equations in two unknowns by Substitution method in real life situations c) solve linear equations in two unknowns by elimination method in real life situations d) apply linear equations in two unknowns in real life situations e) use IT devices to work out linear learning and for enjoyment, f) recognize use of linear equations in real life.	The learner is guided to: • role play activities such as shopping on two different items in the shop to form linear equations in two unknowns. • discuss with others and use other activities with two unknowns • discuss and use substitution method to find the solutions of simultaneous equations in two unknowns. • discuss and use elimination method to find the solutions of simultaneous equations in two unknowns. • practice forming and solving simultaneous equations in two unknowns of real life cases using any method. • watch videos or use other materials involving linear equations in two unknowns.	1. How do we solve linear equations in two unknowns? 2. Where do we use linear equations in two unknowns in real life situations?
Core Competencies to be developed; • **Communication and collaboration**; as learners discuss and use substitution methods to find the solutions of simultaneous equations in two unknowns.				

- **Digital literacy**; as learners watch videos or use other materials involving linear equations in two unknowns.

Values

- **Responsibility** through dedication and commitment; as learners practice forming and solving simultaneous equations in two unknowns of real life cases

Pertinent and Contemporary Issues (PCIs)

- **Citizenship**; as learners role play shopping activities on two different items in the shop to form linear equations in two unknowns.

Links to other subjects

- **Language**; as learners discuss and use substitution methods to find the solutions of simultaneous equations.

Suggested Rubric

Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to form linear equations in two unknowns	Forms linear equations in two unknowns systematically and accurately	Forms linear equations in two unknowns correctly	Forms linear equations in two unknowns partially	Forms linear equations in two unknowns with difficulties
Ability to solve linear equations in two unknowns by Substitution method	Solves linear equations in two unknowns by Substitution method systematically and accurately	Solves linear equations in two unknowns by Substitution method accurately	Solves linear equations in two unknowns by Substitution method partially	Solves linear equations in two unknowns by Substitution method with difficulties
Ability to solve linear equations in two	solves linear equations in two unknowns by elimination method	Solves linear equations in two unknowns by	Solves linear equations in two unknowns by	Solves linear equations in two unknowns by

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
unknowns by elimination method	accurately and systematically	elimination method accurately	elimination method partially	elimination method with difficulties
Ability to apply linear equations in two unknowns	Applies linear equations in two unknowns correctly and proficiently	Applies linear equations in two unknowns correctly	Applies linear equations in two unknowns partially	Applies linear equations in two unknowns with difficulties

STRAND 3.0: MEASUREMENTS

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
3.0 Measurements	**3.1 Circles** (5 lessons)	By the end of the sub- strand the learner should be able to; a) work out the circumference of a circle in real life situations b) work out the length of an Arc of a circle in different situations c) calculate the Perimeter of a sector of a circle in different situations d) use IT or other resources for more learning on circles e) promote use of circles in real life situations.	The learner is guided to: • discuss with others and find the circumference of different circular objects in the environment. • use cut outs to relate arc length to the circumference of a circle, starting with semicircle, then quarter of a circle etc. • draw circles and work out the circumference of a circle, and arc length of a circle. • use cut outs of sectors of circles from locally available materials and work out the perimeter of the sectors. Discuss and make any object with the sector that can be used in real life situations. • use IT or other resources to explore use of sectors of circles in daily life	1. How do we determine the circumference of a circle? 2. How do we use sectors of a circle in real life situations?

Core Competencies to be developed;

- **Communication and collaboration**; as learners discuss and find the circumference of different circular objects in the environment.
- **Creativity and imagination**; as learners use cut outs to relate arc length to the circumference of a circle.

Values

- **Integrity**: as learners draw circles of given dimensions and work out the circumference of a circle.
- **Responsibility**; as learners make any objects with the sector that can be used in real life situations.

Pertinent and Contemporary Issues (PCIs)

- **Environmental education**; as learners use locally available materials to cut out sectors responsibly.

Links to other subjects

- **Language**; as learners discuss with others and find the circumference of different circular objects in the environment.

Suggested Rubric

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to work out the circumference of a circle	Works out the circumference of a circle correctly and systematically.	Works out the circumference of a circle correctly	Works out the circumference of a circle incompletely	Works out the circumference of a circle with difficulties
Ability to Work out the length of an Arc of a circle	Works out the length of an Arc of a circle correctly and systematically	Works out the length of an Arc of a circle correctly	Works out the length of an Arc of a circle partially	Works out the length of an Arc of a circle with difficulties

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to Calculate the Perimeter of a sector of a circle	Calculates the Perimeter of a sector of a circle accurately and systematically	Calculates the Perimeter of a sector of a circle accurately	Calculate the Perimeter of a sector of a circle partially	Calculate the Perimeter of a sector of a circle with difficulties

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
3.0 Measurements	**3.2 Area** (10 lessons)	By the end of the sub- strand the learner should be able to; a) calculate the Area of circle in different situations b) work out the Area of a sector of a circle in different situations c) work out the Surface Area of Cubes and Cuboids in real life situations d) work out the Surface area of a cylinders in real life situations e) determine the surface Area of a triangular Prism in different situations f) work out the area of irregular shapes using square grids in real life situations g) use IT and other materials for learning more on area and for enjoyment h) recognise use of length in real life situations.	The learner is guided to: • discuss and work out areas of different circles. • use cut outs of sectors of circles from locally available materials and find the area where they relate the angle of the sector to the area of the circle. Determine the area of a sector of a circle. • use models to find the surface area of cubes, cuboids and cylinders and derive the formulas for each. • apply the formulas to work out surface area of given cubes, cuboids and cylinders. • use models to find the surface area of triangular prisms	How do we use area in real life situations?

			• draw irregular shapes, for example their palm of hands, feet, leaves etc and trace on square grid to estimate the area. • watch videos on models of cubes, cuboid, cylinders and prisms and how to find the surface area. Also make or improvise models or containers from locally available materials.	

Core Competencies to be developed

- **Critical thinking and problem solving**; as learners use cut outs of sectors of circles from locally available materials and find the area.
- **Learning to learn**; as learners use models to find the surface area of cubes, cuboids and cylinders and derive the formulas for each.

Values

- **Responsibility** through excellence as learners use models to find the surface area of triangular prisms.

Pertinent and Contemporary Issues (PCIs)

- **Safety**; as learners handle different instruments to make cut outs of sectors from locally available materials and find the area where they relate the angle of the sector to the area of the circle.
- **Environmental education;** as learners use locally available materials to draw irregular shapes, for example their palm of hands, feet, leaves etc and trace on square grid to estimate the area.

Links to other subjects

- **Creative Arts** as learners draw irregular shapes, for example their palm of hands, feet, leaves.

Suggested Rubric

Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to calculate the Area of circle	Calculates the Area of circle correctly and systematically	Calculates the Area of circle correctly	Calculates the Area of circle inconsistently	Calculate the Area of circle with difficulties
Ability to work out the Area of a sector of a circle	Works out the Area of a sector of a circle correctly and systematically	Works out the Area of a sector of a circle correctly	Works out the Area of a sector of a circle partially	Works out the Area of a sector of a circle with difficulties
Ability to work out the Surface Area of Cubes and Cuboids	Works out the Surface Area of Cubes and Cuboids correctly and proficiently	Works out the Surface Area of Cubes and Cuboids correctly	Work out the Surface Area of Cubes and Cuboids partially	Work out the Surface Area of Cubes and Cuboids with difficulties
Ability to work out the Surface area of a cylinders	Works out the Surface area of cylinders systematically and accurately	Work out the Surface area of a cylinders accurately	Work out the Surface area of a cylinders partially	Work out the Surface area of a cylinders with difficulties
Ability to determine the surface Area of a triangular Prism	Determines the surface Area of a triangular Prism Precisely	Determines the surface Area of a triangular Prism correctly	Determines the surface Area of a triangular Prism Partially	Determines the surface Area of a triangular Prism with difficulties

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to work out the area of irregular shapes using square grids	Works out the area of irregular shapes using square grids accurately and creatively	Works out the area of irregular shapes using square grids accurately	Works out the area of irregular shapes using square grids incompletely	Works out the area of irregular shapes using square grids with difficulties

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
3.0 Measurements	**3.3 Money** (9 lessons)	By the end of the sub- strand, the learner should be able to; a) identify interest and principal in real life situations b) calculate simple interest in real life situations c) calculate compound interest per annum step by step up to three years in real life situations d) work out appreciation and depreciation per annum step by step up to three years in different situations e) work out hire purchase in real life situations f) use IT and other resources to carry out operations related to money. g) spend money responsibly on needs and leisure	The learner is guided to: • visit or invite resource persons from different financial institutions in the neighborhood of the school or home and gather information about simple and compound interests offered on deposits (principal). • enquire and discuss terms of interests on deposits (principal) as part of consumer awareness and protection • discuss and work out compound interest • identify and discuss objects or goods that appreciate and depreciate in value to inform decision making on goods that are worth investing in or buying. • determine Appreciation and Depreciation using a step by step method.	1. What is interest in money? 2. How do we pay for goods on hire purchase?

			• visit places that items are offered on hire purchase and discuss different terms of purchase. This can be done either as physical or online searches. They can relate different pricing of the goods. They should discuss the installments periods and time to inform purchasing decisions that will protect from products that highly lose value with time. • use IT to access online shopping platforms and identify terms of sale.	

Core Competencies to be developed

- **Communication and collaboration**; as learners gather information about simple and compound interests offered on deposits (principal)
- **Critical thinking and problem solving**; as learners determine Appreciation and Depreciation using step by step methods and discuss what goods are worth investing in or buying.
- **Digital literacy**; as learners do a search on online shopping platforms or other sources for different types of goods for consumer awareness.

Values

- **Responsibility** as learners make responsible choices on shopping goods that they appreciate.

Pertinent and Contemporary Issues (PCIs)

- **Citizenship** as learners use money (Kenya shillings) to buy goods.

Links to other subjects

- **Languages**; as learners identify and discuss objects and goods that appreciate and depreciate in value.

Suggested Rubric

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to identify interest and principal	Identifies interest and principal precisely	Identifies interest and principal accurately	Identifies interest and principal partially	Identifies interest and principal with difficulties
Ability to calculate Simple Interest	Calculates Simple Interest correctly and proficiently	Calculates Simple Interest correctly	Calculates Simple Interest partially	Calculate Simple Interest with difficulties
Ability to calculate Compound Interest per annum step by step up to three years	Calculates Compound Interest per annum step by step up to three years systematically and accurately	Calculates Compound Interest per annum step by step up to three years accurately	Calculates Compound Interest per annum step by step up to three years partially	Calculates Compound Interest per annum step by step up to three years with difficulties
Ability to work out Appreciation and Depreciation per	Works out Appreciation and Depreciation per annum step by step up	Works out Appreciation and Depreciation per	Works out Appreciation and Depreciation per	Works out Appreciation and Depreciation per

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
annum step by step up to three years	to three years systematically and accurately	annum step by step up to three years accurately	annum step by step up to three years partially	annum step by step up to three years with difficulties
Ability to work out Hire Purchase	Works out Hire Purchase accurately and Proficiently	Works out Hire Purchase accurately	Works out Hire Purchase partially	Works out Hire Purchase with difficulties

STRAND 4.0: GEOMETRY

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
4.0 Geometry	**4.1 Geometrical Constructions** (12 lessons)	By the end of the sub- strand, the learner should be able to; a) construct parallel and perpendicular lines in different situations b) divide a line proportionally in different situations c) identify angle properties of polygons in different situations d) construct regular polygons up to a hexagon in different situations e) construct irregular polygons up to a hexagon in different situations f) construct circles passing through the vertices of a triangle in different situations g) construct circles touching the sides of the triangle in different situations	The learner is guided to: • practice constructing parallel and perpendicular lines. • practice divide a line proportionally, for example, using a set square and a ruler only or pair of compasses. • discuss angle properties of polygons and relate the number of right angles to the number of sides. They can determine the angles in a given polygon. • construct regular polygons using pair of compasses, rulers, protractors. • construct irregular polygons using pair of compasses, rulers, protractors. • practice constructing circles passing through vertices of given triangles.	1. How do we construct polygons? 2. Where do we use polygons in real life situations?

		h) use IT as well as other materials to learn more about geometric constructions and for skills development, i) admire geometric patterns in objects and substances in real life.	• practice constructing circles touching sides of given triangles. • watch videos on how to construct polygons, use different construction software. • use IT or other devices to create patterns using circles touching sides of triangles or polygons.	

Core Competencies to be developed;

- **Communication and collaboration**; as learners discuss angle properties of polygons and relate the number of right angles to the number of sides.
- **Digital literacy**; as learners use IT or other devices to create patterns using circles touching sides of triangles or polygons.

Values

- **Responsibility** and respect; as learners discuss angle properties of polygons and relate the number of right angles to the number of sides.

Pertinent and Contemporary Issues (PCIs)

- **ESD**; as learners use IT or other resources to create patterns using circles touching sides of triangles or polygons.

Links to other subjects

- **Pre-technical** and pre-career; as learners construct regular polygons using a pair of compasses, rulers, protractors.

Suggested Rubric				
Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to construct parallel and perpendicular lines	Constructs parallel and perpendicular lines accurately and proficiently	Constructs parallel and perpendicular lines accurately	Constructs parallel or perpendicular lines correctly	Construct parallel and perpendicular lines with difficulties
Ability to divide a line proportionally	Divides a line proportionally systematically	Divides a line proportionally accurately	Divides a line proportionally inconsistently	Divides a line proportionally with difficulties
Ability to Identify angle properties of polygons	Identifies angle properties of polygons Precisely	Identifies angle properties of polygons correctly	Identifies angle properties of polygons partially	Identifies angle properties of polygons with difficulties
Ability to construct regular polygons up to a hexagon	Constructs regular polygons up to a hexagon accurately and systematically	Constructs regular polygons up to a hexagon accurately	Construct regular polygons up to a hexagon inconsistently	Construct regular polygons up to a hexagon with difficulties
Ability to construct irregular polygons up to a hexagon	Constructs irregular polygons up to a hexagon systematically	Constructs irregular polygons up to a hexagon accurately	Construct irregular polygons up to a hexagon partially	Constructs irregular polygons up to a hexagon with difficulties
Ability to construct circles passing through the vertices of a triangle	Constructs circles passing through the vertices of a triangle correctly and Proficiently	Constructs circles passing through the vertices of a triangle correctly	Constructs circles passing through the vertices of a triangle partially	Constructs circles passing through the vertices of a triangle with difficulties

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to construct circles touching the sides of the triangle	Constructs circles touching the sides of the triangle accurately and systematically	Constructs circles touching the sides of the triangle accurately	Constructs circles touching the sides of the triangle partially	Constructs circles touching the sides of the triangle with difficulties

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
4.0 Geometry	**4.2 Coordinates and graphs** (14 lessons)	By the end of the sub- strand, the learner should be able to; a) draw a labelled Cartesian plane on different learning materials b) identify points on the Cartesian plane in different situations c) plot points on the Cartesian plane in different situations d) generate table of values for a linear equation in different situations e) determine an appropriate scale for a linear equation on the Cartesian plane in different situations f) draw a linear graph from table of values on Cartesian plane in different situations g) solve simultaneous linear equations graphically in different situations	The learner is guided to: • draw and appropriately label the axes on the Cartesian plane • practice locating and plotting points on a Cartesian plane appropriately. • discuss and read coordinates of points on the Cartesian plane. They write the coordinates in terms of (horizontal value, vertical value) • discuss, choose and use appropriate scale for a given data. • discuss and make an appropriate table of values for a given linear equation and draw the linear graphs • generate the values in a table of the simultaneous linear equations and draw	1. How do we plot coordinates on a Cartesian plane? 2. Where do we use linear graphs in real life?

		h) apply simultaneous equations in real life situations i) use IT or other resources to learn more on coordinates and graphs and for fun. j) reflect on the use of graphs in real life.	the graphs, read the point of intersection as solution for the equations. • discuss and form simultaneous equations from statements and solve using graphs. • use IT graphing tools to create linear graphs or use other materials to practice drawing linear graphs.	
Core Competencies to be developed • **Communication and collaboration**; as learners discuss and read coordinates of points on the Cartesian plane. • **Critical thinking and problem solving;** as learners generate the values in a table of the simultaneous linear equations • **Digital literacy**; as learners learn, use IT graphing tools to create linear graphs.				
Values • **Respect** as learners discuss and make an appropriate table of values for a given linear equation and draw the linear graphs				
Pertinent and Contemporary Issues (PCIs) • **Citizenship** as learners practice locating and plotting points on a Cartesian plane appropriately.				
Links to other subjects • **Integrated Science** as learners draw the graphs of different content areas.				

Suggested Rubric				
Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to draw a labelled Cartesian Plane	Draws a labelled Cartesian Plane correctly and proficiently	Draws a labelled Cartesian Plane correctly	Draws a labelled Cartesian Plane partially	Draws a labelled Cartesian Plane with difficulties
Ability to identify points on the Cartesian plane	Identifies points on the Cartesian plane precisely	Identifies points on the Cartesian plane correctly	Identifies some points on the Cartesian plane	Identifies points on the Cartesian plane with difficulties
Ability to plot Points on the Cartesian Plane	Plots Points on the Cartesian Plane precisely	Plots Points on the Cartesian Plane correctly	Plot some points on the Cartesian Plane correctly	Plot Points on the Cartesian Plane with difficulties
Ability to generate table of values for a linear equation	Generates table of values for a linear equation accurately and creatively	Generates table of values for a linear equation accurately	Generates table of values for a linear equation partially	Generates table of values for a linear equation with difficulties
Ability to determine an appropriate Scale for a linear equation on the Cartesian plane	Determines an appropriate Scale for a linear equation on the Cartesian plane systematically	Determines an appropriate Scale for a linear equation on the Cartesian plane accurately	Determines an appropriate Scale for a linear equation on the Cartesian plane partially	Determines an appropriate Scale for a linear equation on the Cartesian plane with difficulties
Ability to draw a linear graph from table of values on Cartesian plane	Draws a linear graph from table of values on Cartesian plane	Draws a linear graph from table of values on Cartesian plane accurately	Draws a linear graph from table of values on Cartesian plane partially	Draws a linear graph from table of values on Cartesian plane with difficulties

	accurately and precisely			
Ability to Solve Simultaneous Linear Equations Graphically	Solves Simultaneous Linear Equations Graphically Systematically	Solves Simultaneous Linear Equations Graphically accurately	Solves Simultaneous Linear Equations Graphically partially	Solves Simultaneous Linear Equations Graphically with difficulties
Ability to Apply simultaneous equations in real life situations	Applies simultaneous equations creatively	Applies simultaneous equations correctly	Applies simultaneous equations partially	Applies simultaneous equations with difficulties

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
4.0 Geometry	**4.3 Scale Drawing** (14 lessons)	By the end of the sub- strand, the learner should be able to; a) represent length to a given scale in different situations. b) convert actual length to scale length in real life situations c) convert scale length to actual length in real life situations. d) interpret linear scales in statement form in different situations. e) write linear scales in statement form in different situations. f) interpret linear scales in ratio form in different situations. g) write linear scales in ratio form in different situations. h) convert linear scale from statement form to ratio form and ratio form to statement form in different situations i) make scale drawings in different situations j) apply scale drawing in real life situations.	The learner is guided to: • measure and represent length of different objects from immediate environment in his/her work book • discuss and practice converting scale from one form to another • read, discuss and interpret given linear scales in statement form. • discuss and write given linear scales in statement form. • read, discuss and interpret given linear scales in ratio form. • discuss and carry out conversions of scales from one form to another. • make scale drawings on different learning materials using appropriate scale.	1. How do we determine scales in real life? 2. Where do we use scale drawing in real life situations?

		k) use IT or other resources to learn more on scale drawing. l) recognise the use of scale drawing in maps.	• use ICT devices to display the maps and use the zoom functions to demonstrate scale. • Use maps to demonstrate scale	

Core Competencies to be developed

- **Communication and collaboration**; as learners discuss and practice converting scale from one form to another
- **Critical thinking and problem solving**; as learners discuss and write given linear scales in statement form.
- **Digital literacy**; as learners use ICT devices to display the maps and use the zoom functions to demonstrate scale.

Values

- **Responsibility** as learners read, discuss and interpret given linear scales in ratio form.
- **Citizenship** as learners measure and represent the length of different objects from the immediate environment in his/her work book.

PCIs

- **Environmental** education as learners measure and represent the length of different objects from the immediate environment in his/her work book.

Links to other subjects

- **Pre-technical** and pre-career as learners read and make scale drawings.

Suggested Rubric				
Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to represent length to a given Scale	Represents length to a given Scale correctly and proficiently	Represents length to a given Scale correctly	Represents length to a given Scale partially	Represents length to a given Scale with difficulties
Ability to convert actual length to scale length	Converts actual length to scale length accurately and systematically	Converts actual length to scale length accurately	Converts actual length to scale length partially	Convert actual length to scale length with difficulties
Ability to convert scale length to actual length	Converts scale length to actual length and systematically	Converts scale length to actual length accurately	Converts scale length to actual length partially	Convert scale length to actual length with difficulties
Ability to Interpret linear scales in statement form	Interprets linear scales in statement form comprehensively	Interpret linear scales in statement form correctly	Interprets linear scales in statement form partially	Interpret linear scales in statement form with difficulties
Ability to write linear scales in statement form	Writes linear scales in statement form comprehensively	Writes linear scales in statement form correctly	Writes linear scales in statement form inconsistently	Writes linear scales in statement form with difficulties
Ability to Interpreting linear scales in ratio form	Interprets linear scales in ratio form comprehensively	Interprets linear scales in ratio form correctly	Interprets linear scales in ratio form partially	Interprets linear scales in ratio form with difficulties
Ability to writing linear scales in ratio form	Writes linear scales in ratio form correctly and proficiently	Writes linear scales in ratio form correctly	Writes linear scales in ratio form inconsistently	Writes linear scales in ratio form with difficulties

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to convert linear scale from statement form to ratio form and ratio form to statement form	Converts linear scale from statement form to ratio form and ratio form to statement form Systematically	Converts linear scale from statement form to ratio form and ratio form to statement form correctly	Converts linear scale from statement form to ratio form and ratio form to statement form partially	Converts linear scale from statement form to ratio form and ratio form to statement form with difficulties
Ability to make scale drawings	Makes scale drawings accurately and proficiently	Makes scale drawings accurately	Makes scale drawings partially	Makes scale drawings with difficulties
Ability to apply scale drawing	Applies scale drawing accurately and creatively	Applies scale drawing accurately	Apply scale drawing partially	Apply scale drawing with difficulties

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
4.0 Geometry	**4.4 Common Solids** (16 lessons)	By the end of the sub- strand, the learner should be able to; a) identify common solids from the environment b) sketch nets of cubes, cuboids, cylinders, pyramids and cones in different situations c) work out surface area of the solids from nets of solids in different situations d) determine the distance between two points on the surface of a solid in different situations e) make models of hollow and compact solids for skills development f) use IT devices or other materials to draw models and nets of solids in different situations g) promote the use of common solids in real life situations.	The learner is guided to: • collect common solids such as cubes, cuboids, cylinders, pyramids and cones from the immediate environment. • discuss, open and sketch the nets of hollow solids. • work out the surface area of solids from nets. • discuss and practice measuring the distance between any two points on the surface of the solids. • make models of hollow and compact solids using locally available materials. Hollow solids (containers) may be of cubes, cuboids, cylinders, pyramids or cones. Compact solids (eg. bricks) may be of cubes, cuboids or cylinders. • use IT devices to watch videos on common solids, nets and draw the solids and nets.	1. What are common solids? 2. How do we use common solids in real life? 3. How do you determine surface areas of solid? 4. How do you determine the volume of common solids?

			• use other resources such as print or realia to trace or draw nets of solids.	

Core Competencies to be developed;

- **Communication and collaboration**; as learners discuss and work in groups to collect solids from the environment.
- **Creativity and imagination**; as learners make the models of different solids.

Values

- **Responsibility, love and respect**; as learners work in groups to collect solids and make models

Pertinent and Contemporary Issues (PCIs)

- **ESD**; as learners collect solids from the environment and use locally available materials to make models.
- **Self –esteem** as learners open nets of solids and make models

Links to other subjects

- **Pre-career and pre-technical**; as learners sketch nets of different solids as practice in technical drawing
- **Creative Art**: as learners make the models of different solids.

Suggested Rubric				
Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to identify common solids	Identifies common solids comprehensively	Identifies common solids correctly	Identifies common solids inconsistently	Identifies common solids with difficulties
Sketching nets of cubes, cuboids, cylinders, pyramids and cones	Sketches nets of cubes, cuboids, cylinders, pyramids and cones correctly and creatively	sketches nets of cubes, cuboids, cylinders, pyramids and cones correctly	Sketches nets of cubes, cuboids, cylinders, pyramids and cones incompletely	Sketches nets of cubes, cuboids, cylinders, pyramids and cones with difficulties
Ability to work out surface area of the solids from nets of solids	Works out surface area of the solids from nets of solids accurately and systematically	Works out surface area of the solids from nets of solids accurately	Works out surface area of the solids from nets of solids partially	Work out surface area of the solids from nets of solids with difficulties
Ability to determine the distance between two points on the surface of a solid	Determines the distance between two points on the surface of a solid precisely	Determines the distance between two points on the surface of a solid accurately	Determines the distance between two points on the surface of a solid partially	Determines the distance between two points on the surface of a solid with difficulties
Ability to make models of common solids	Makes models of common solids creatively	Makes models of common solids correctly	Makes models of common solids incompletely	Makes models of common solids with difficulties

STRAND 5.0: DATA HANDLING AND PROBABILITY

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Questions
5.0 **Data Handling and Probability**	**5.1 Data Presentation and Interpretation (10 lessons)**	By the end of the sub- strand, the learner should be able to; a) draw bar graphs of data from real life situations b) interpret bar graphs of data from real life situations c) draw line graphs of given data from real life situations d) interpret line graphs of data from real life situations e) identify the mode of a set of discrete data from real life situations f) calculate the mean of a set of discrete data from real life situations g) determine the median of a set of discrete data from real life situations h) use IT or other materials to determine the mean, mode	The learner is guided to: • collect data from immediate environment or experiences, for example size of shoes, height or test scores. • use a suitable scale to represent the data in bar graphs. • discuss and interpret bar graphs • discuss and represent data in line graphs • discuss and interpret line graphs • recognize the mode from a given set of discrete data • discuss and to work out the average from different sets of discrete data and relate it to the mean. • carry out different activities that involve getting the median position. For example, where possible learners use the hand to identify the middle finger in reference to the position.	1. What are the different ways of representing data? 2. How do we determine the mean of data?

		and median of discrete data in different situations i) promote use of data representation and interpretation in real life situations.	• arrange given data in ascending order and identify the middle value which is the median. • use IT to create bar graphs and line graphs to represent the data, calculate the mean, the mode and the median. • use other resources to draw bar and line graphs	

Core Competencies to be developed;

- **Communication and collaboration**; as learners discuss and represent data in line graphs
- **Critical thinking and problem solving;** as learners discuss and interpret Bar graphs
- **Self-efficacy** as learners collect data from their own experiences, for example size of shoes, height or test scores.

Values

- **Love and respect**; as learners carry out different activities that involve getting the median position. For example, where possible learners use the hand to identify the middle finger in reference to the position.
- **Social cohesion**; as learners collect data from their own experiences, for example size of shoes, height or test scores.

Pertinent and Contemporary Issues (PCIs)

- **Environmental Education** as learners collect data from immediate environment or experiences, for example size of shoes, height or test scores.

Links to other subjects

- **Social Studies** as learners discuss and work out the average from different sets of discrete data such as populations and relate it to the mean.

Suggested Rubric				
Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to draw bar graphs of data	Draws bar graphs of data correctly and systematically	Draws bar graphs of data correctly	Draws bar graphs of data partially	Draws bar graphs of data with difficulties
Ability to Interpret bar graphs from data	Interprets bar graphs from data comprehensively	Interprets bar graphs from data correctly	Interprets bar graphs from data incompletely	Interprets bar graphs from data with difficulties
Ability to draw line graphs of data	Draws line graphs of data correctly and systematically	Draws line graphs of data accurately	Draws line graphs of data partially	Draws line graphs of data with difficulties
Ability to Interpret line graphs of data	Interprets line graphs from given data comprehensively	Interprets line graphs from data correctly	Interprets line graphs from data incompletely	Interprets line graphs from data with difficulties
Ability to Identify the mode of a set of discrete data	Identifies the mode of a set of discrete data comprehensively	Identifies the mode of a set of discrete data correctly	Identifies the mode of a set of discrete data inconsistently	Identifies the mode of a set of discrete data with difficulties
Ability to calculate the mean of a set of discrete data	Calculates the mean of a set of discrete data proficiently	Calculates the mean of a set of discrete data accurately	Calculates the mean of a set of discrete data partially	Calculates the mean of a set of discrete data with difficulties
Ability to determine the median of a given set of discrete data	Determines the median of a given set of discrete data systematically	Determines the median of a given set of discrete data accurately	Determines the median of a given set of discrete data partially	Determines the median of a given set of discrete data with difficulties

Strand	Sub-Strand	Specific Learning Outcome	Suggested Learning Experiences	Key Inquiry Questions
5.0 Data Handling and Probability	**5.2 Probability** (7 lessons)	By the end of the sub- strand, the learner should be able to; a) identify events involving chance in real life situations b) perform chance experiments in different situations c) write the experimental probability outcomes in different situations d) express the probability outcomes in fractions in different situations e) express the probability outcomes in decimals or percentages in different situations f) use IT and other materials to play games involving probability g) recognise events that happen by chance in real life situations.	The learner is guided to: • discuss daily events that are likely or unlikely to happen or will not happen. • discuss and carry out different chance experiments like flipping the coins, tossing the dice or drawing colored balls from a bag one ball at a time. • record the probability of the chance outcomes in fractions, decimals and percentages. • use IT or other resources to play games involving probability	1. When do we consider chances that an event is likely to happen? 2. Why is probability important in real life situations?

Core Competencies to be developed;

- **Communication and collaboration**; as learners discuss daily events that are likely/unlikely to happen/will not happen.
- **Critical thinking and problem solving**; as learners discuss and carry out different chance experiments like flipping the coins.
- **Self-efficacy** as learners discuss and carry out different chance experiments like flipping the coins and avoid harmful practices of gambling

Values

- **Responsibility** as learners use IT devices or other resources such as coins, balls in the study of probability.

Pertinent and Contemporary Issues (PCIs)

- **ESD** as learners discuss daily events that are likely/unlikely to happen/will not happen that may relate to the environment.

Links to other subjects

- **Social Studies** as learners discuss daily events that are likely/unlikely to happen/will not happen that may involve the weather.

Suggested Rubric

Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to Identify events involving chance in real life situations	Identifies events involving chance in real life situations comprehensively	Identifies events involving chance in real life situations correctly	Identifies events involving chance in real life situations partially	Identifies events involving chance in real life situations with difficulties
Ability to Performing chance experiments	Performs chance experiments accurately and proficiently	Performs chance experiments accurately	Performs chance experiments partially	Performs chance experiments with difficulties
Ability to Writing the experimental probability outcomes	Writes the experimental probability outcomes Precisely	Writes the experimental probability outcomes correctly	Writes the experimental probability outcomes partially	Writes the experimental probability outcomes with difficulties

Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to Expressing the probability outcomes in fractions	Expresses the probability outcomes in fractions correctly and consistently	Expresses the probability outcomes in fractions correctly	Expresses the probability outcomes in fractions partially	Expresses the probability outcomes in fractions with difficulties
Ability to Expressing the probability outcomes in decimals or percentages	Expresses the probability outcomes in decimals or percentages correctly and consistently	Expresses the probability outcomes in decimals or percentages correctly	Expresses the probability outcomes in decimals or percentages partially	Expresses the probability outcomes in decimals or percentages with difficulties

COMMUNITY SERVICE LEARNING PROJECT

Introduction

In Grade 8, focus is on making preparations to undertake a CSL activity of their own choice. They will be required to identify a community problem through research, plan and come up with solutions to solve the problem. The preparations will be carried out in groups. Learners will build on CSL knowledge, skills and attitudes acquired during Life Skills Education as well as other subjects.

CSL Skills to be Covered:

i) **Leadership**: Learners develop leadership skills as they undertake various roles during preparation.
ii) **Financial Literacy and Entrepreneurship Skills:** Learners will gain skills on wise spending, saving and investing for sustained economic growth. They could consider ways of generating income as they undertake the CSL project through innovation ways. Moreover, they could identify business ideas and opportunities as well as resources to meet the needs of the community.
iii) **Research:** Learners will be expected to identify a problem or pertinent issue in the community and indicate how the problem will be solved. They will also acquire skills on how to report their findings.
iv) **Communication:** Learners indicate reporting mechanisms to be used during the actual project e.g., how they intend to communicate with members of the community, either online or offline.
v) **Citizenship:** As learners engage in the CSL activities for this Grade, they will be vested with the rights, privileges and duties of a citizen, hence giving them a sense of belonging and attachment to the nation. They will also be empowered to engage and assume active roles in shaping a more peaceful, tolerant and inclusive society.
vi) **Life Skills Education:** Learners will be equipped with life skills including decision making, assertiveness, effective communication, problem solving and stress management. This will enable them to manage interpersonal relationships, develop leadership skills as well as discover and grow their talents.

vii) **Community Development:** Learners will be empowered with skills necessary to effect relevant change including building stronger and more resilient communities.

Suggested Pertinent and Contemporary Issues (PCIs)	**Specific Learning Outcomes**	**Suggested Learning Experiences**	**Key Inquiry Questions**
• Environmental degradation • Life style diseases • Communicable and non-communicable diseases • Poverty • Violence in community • Food security issues • Conflicts in the community **Note:** The suggested PCIs are only examples. Teachers should allow learners to identify PCIs as per their context and reality.	By the end of the CSL project, the learner should be able to: a) identify a problem in the community through research b) plan to solve the identified problem in the community, c) design solutions to the identified problem, d) appreciate the need to belong to a community.	The learner is guided to: ● brainstorm on pertinent and contemporary issues in their community that need attention in groups ● choose a PCI that needs immediate attention and explain why in groups ● carry out research using digital devices print media/interactions with members of the community/resource persons in identifying a community problem to address in groups ● discuss possible solutions to the identified issue in groups ● propose the most appropriate solution to the problem in groups ● discuss ways and instruments they can use to collect data on the problem (questionnaires, interviews, observation schedule, etc)	1. How does one determine community needs? 2. Why is it necessary to make adequate preparations before embarking on a project?

		• develop instruments for data collection • identify resources needed for the CSL project (human, technical, financial) • discuss when the project will begin and end • prepare a programme/timetable of the entire project execution • Assign roles to be carried by all group members • reflect on how the project preparation enhanced learning.	

Key Component of CSL developed

a) Identification of a problem in the community through research
b) planning to solve the identified problem
c) designing solutions to the identified problem

Core competencies to be developed

- **Communication and collaboration**: Learners will make the preparations in groups and conduct discussions on best ways of carrying out the project.
- **Self-efficacy**: Learners develop the skills of self-awareness and leadership as they undertake the CSL project
- **Creativity and Imagination**: Learners will come up with creative ways of solving the identified community problem
- **Critical Thinking and Problem Solving:** Learners will demonstrate autonomy in identifying a community need, exploring plausible solutions and making necessary preparations to address the problem.
- **Digital Literacy:** Learners can use technology when as they research on a community problem that they can address.
- **Learning to Learn:** Learners gain new knowledge and skills as they identify a community problem to be addressed and make preparations to carry out the project.

- **Citizenship**: This is enhanced as learners choose a PCI that needs immediate attention in the community.

Pertinent and Contemporary Issues (PCIs)

- Social cohesion as learners discuss possible solutions to the identified issue.
- Critical thinking as learners discuss possible solutions to the identified issue.

Values

- Integrity as learners carry out research using digital devices and print media as they identify a community problem to address.
- Respect as learners brainstorm on pertinent and contemporary issues in their community that need attention

Assessment Rubric

Indicator	Exceeds Expectation	Meets Expectation	Approaches Expectation	Below Expectation
Ability to identify a problem in the community through research	Correctly and precisely identifies a problem in the community through research	Correctly identifies a problem in the community through research	Partially identifies a problem in the community through research	Partially identifies a problem in the community through research with assistance
Ability to plan to solve the identified problem	Accurately and systematically plans to solve the identified problem	Accurately plans to solve the identified problem	Plans to solve the identified problem leaves out some details	With assistance plans to solve the identified problem but leaves out many details

Ability to design solutions to the identified problem	Correctly and elaborately designs solutions to the identified problem	Correctly designs solutions to the identified problem	Partly designs solutions to the identified problem	Partly designs solutions to the identified problem with prompting

APPENDIX 1: LIST OF ASSESSMENT METHODS, LEARNING RESOURCES AND NON-FORMAL ACTIVITIES

Strand	Sub strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal Activities
Numbers	Integers	• Class activities • Class written tests • Home or extended assignments or activities • Projects	Number lines games on charts Number cards, steps,	Prepare or improvise number line games on charts
	Fractions	• Class activities • Class written tests • Home or extended assignments or activities	Multiplication tables	
	Decimals	• Class activities • Class written tests • Home or extended assignments or activities	Multiplication tables	
	Squares and square roots	• Class activities • Class written tests	Equivalent fraction board, Circular and	

		• Home or extended assignments or activities	Rectangular cut outs, Counters	
	Rates, ratios, proportions and percentages	• Class activities • Class written tests • Home or extended assignments or activities	Place value charts, Number cards	
Algebra	Algebraic Expressions	• Class activities • Class written tests • Home or extended assignments or activities • Project	Information from different sources	Carry out activities involving classifying objects in their immediate environment according to given attributes such as similarities or differences. This can be done at home. Take photos and share with class or school. Use the concept of classification of objects to organize and arrange personal items at school and home.
	Linear Equations	• Class activities • Class written tests • Out of class assignments	Information from different sources	
Measurement	Circles	• Class activities • Class written tests	Cut outs of sectors, papers, ruler	

		• Out of class assignments		
	Area	• Class written tests • Out of class assignments or activities	Square cut outs, squares, 1m squares	
	Money	• Class activities • Home or extended assignments or activities • project	Price Lists for commodities, model shop, Electronic money	Research, identify and discuss different products/goods that appreciate or depreciate. This can be done through online or other forms of searches. Create a table of products and the two prices: one for cash payment, the other for hire purchase payment. This is to inform purchasing decisions that will protect consumers from products that highly lose value with time.
Geometry	Geometric constructions	• Class activities • Class written tests • Out of class assignments or activities	Unit angles, Protractors, Pair of compasses, Rulers, Straight edges	
	Coordinates and graphs	• Class activities • Class written tests	rulers, plotting/graph paper	

		• Out of class assignments or activities		
	Scale drawing	• Class activities • Class written tests • Home or extended assignments or activities	Unit angles, Protractors, Pair of compasses, Rulers, Straight edges	
	Common solids	• Class activities • Class written tests • Home or extended assignments or activities • project	Containers, compact solid objects, water, soil, clay, waste news/papers	Make models of hollow and compact solids using locally available materials. Hollow solids (containers) may be of cubes, cuboids, cylinders, pyramids or cones and can be improvised from existing resources. Compact solids (e.g. sample bricks) may be of cubes, cuboids or cylinders.
Data handling and probability	Data handling	• Class activities • Class written tests • Home or extended assignments or activities	Data from different sources	

	Probability	• Class activities • Class written tests • Home or extended assignments or activities	Data from different sources	

APPENDIX 2: USE OF ICT TOOLS

The following ICT tools may be used in learning and teaching of mathematics at this level:

1. Learner digital devices (**LDD**)
2. Teacher digital devices(**TDD**)
3. Mobile phones
4. Digital clocks
5. Television sets
6. Videos
7. Cameras
8. Projectors
9. Radios
10. DVD players
11. CD's
12. Scanners
13. Internet
14. Other resources.