REPUBLIC OF KENYA

MINISTRY OF EDUCATION

JUNIOR SCHOOL CURRICULUM DESIGN

GRADE 9

MATHEMATICS

FOR LEARNERS WITH HEARING IMPAIRMENTS

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 Constitution of Kenya 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, Primary and Junior School levels.

The implementation of Competency Based Curriculum involves monitoring and evaluation to determine its success. After the five-year implementation cycle, a summative evaluation of the primary education cycle was undertaken to establish the achievement of learning outcomes as envisaged in the Basic Education Curriculum Framework. The Government of Kenya constituted a Presidential working Party on Education Reforms (PWPER) in 2022 to address salient issues affecting the education sector. PWPER made far reaching recommendations for basic education that necessitated curriculum review. The recommendations of the PWPER, monitoring reports, summative evaluation, feedback from curriculum implementers and other stakeholders led to rationalisation and review of the basic education curriculum.

The reviewed Grade seven curriculum designs for learners with hearing impairment build on competencies attained by learners at Primary school level. Emphasis at this grade is the development of skills for exploration and making informed decision on pathways based on careers.

The curriculum designs present National Goals of Education, essence statements, general and specific expected learning outcomes for the 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, 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.

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PREFACE

The Ministry of Education (MoE) nationally implemented Competency Based Curriculum (CBC) in 2019. Grade seven is the first grade of Junior school while Grade 9 is the final grade of the level in the reformed education structure.

The reviewed Grade seven curriculum furthers implementation of the CBC from Primary Education level. The curriculum provides opportunities for learners to focus in a field of their choice to form a foundation for further education and training and/or gain employable skills. 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 seven curriculum designs for learners with hearing impairment 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. They 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 seven and prepare them for smooth transition to Grade eight. Furthermore, it is my hope that teachers will use the adapted 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 and review (*SNE adapt*) 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)2017, that responds to the demands of the 21st Century and the aspirations captured in the Constitution of Kenya 2010, the Kenya Vision 2030, East African Community Protocol, International Bureau of Education Guidelines and the United Nations Sustainable Development Goals (SDGs).

KICD receives its funding from the Government of Kenya to facilitate 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 revised Grade seven curriculum designs for learners with hearing impairment were developed and adapted with the support of the World Bank through the Kenya Primary Education Equity in Learning Programme (KPEELP); a project coordinated by MoE. Therefore, the Institute is very grateful for the support of the Government of Kenya, through the MoE and the development partners for policy, resource and logistical support. Specifically, special thanks to the Cabinet Secretary-MoE and the Principal Secretary – State Department of Basic Education,

I 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 and adaptation of the Grade seven curriculum designs for learners with hearing impairment. In relation to this, I 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 and adapting these designs. Finally, I am very grateful to the KICD Council Chairperson and other members of the Council for very consistent guidance in the process.

I assure all teachers, parents and other stakeholders that this curriculum design will effectively guide the implementation of the CBC at Grade seven and preparation of learners with hearing impairment for transition to Grade eight.

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TABLE OF CONTENT

LESSON ALLOCATION

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3	Mathematics for Learners with Hearing Impairment	5
4	Religious Education	4
5	Integrated Science for Learners with Hearing Impairment	5
6	Agriculture for Learners with Hearing Impairment	4
7	Social Studies for Learners with Hearing Impairment	4
8	Creative Arts and Sports for Learners with Hearing Impairment	5
9	Pre- technical Studies for Learners with Hearing Impairment	4
10.	Pastoral/ Religious Instruction Programme	1
	Total	**41**

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 the wake of rapid modernisation. 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 recognises 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-fulfilment**

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 instil 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.

LEVEL LEARNING OUTCOMES

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

1. Apply literacy, numeracy and logical thinking skills for appropriate self-expression.
2. Communicate effectively, verbally, non-verbally, and using sign language in diverse contexts.
3. Demonstrate social skills, and 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 coexistence.
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 whereby we count, add, subtract, multiply or divide quantities and substances, deal with space, shape and structures throughout our daily interactions. Mathematics involves understanding numbers and the numerical operations used to develop strategies for cognitive mathematical problem solving skills, estimation and computational fluency. It is impossible to think of a world without Mathematics. It is applied in economic, scientific, social, religious and political worlds. It is therefore imperative that deaf 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. This curriculum is therefore designed to capture specific adaptations to support deaf learners to understand Mathematics and also prepare 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 emphasises STEM areas. Further, this design has been adapted to ensure that learners who are Deaf and those with Hard of Hearing learn effectively. The adaptations include suggestions for provision of sign interpretation on aspects that require use of sound, use of digital devices with assistive technology, use of visual aids such as charts, maps and diagrams, use of hands-on activities, guided demonstrations, purposeful pairing and use of adapted learning resources. The design has also incorporated alternative learning outcomes and activities to enhance the acquisition of sign language vocabulary to learners with Hearing Impairments.

SUBJECT GENERAL LEARNING OUTCOMES

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 organise 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.

SUMMARY OF STRANDS AND SUBSTRANDS

Strand	Sub-strand
1. NUMBERS	1.1 Integers
	1.2 Cubes and cube roots
	1.3 Indices and logarithms
	1.4 Compound proportions and rates of work
2. ALGEBRA	2.1 Matrices
	2.2 Equations of a straight line
	2.3 Linear inequalities
3. MEASUREMENT	3.1 Area
	3.2 Volume of solids
	3.3 Mass, volume, weight and density
	3.4 Time, distance and speed
	3.5 Money
	3.6 Approximation and errors
4. GEOMETRY	4.1 Coordinates and graphs
	4.2 Scale drawing
	4.3 Similarity and enlargement
	4.4 Trigonometry
5. DATA HANDLING AND PROBABILITY	5.1 Data interpretation (Grouped data)
	5.2 Probability

STRAND 1.0: NUMBERS

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
1.0 NUMBERS	**1.1 Integers** (5 lessons)	By the end of the sub-strand, the learner should be able to: a) sign vocabularies related to integers, b) perform operations on, integers in different situations, c) work out combined operations on integers in different situations, d) apply operations on integers to real life situations, e) promote use of integers in real life situations.	● In groups, learners are guided to fingerspell and sign the basic operations on integers from a given combined operation problem and sign the basic operations of integers in a combined operation problem. ● In pairs, learners are guided to work out the basic operations on integers using number cards and charts. ● In groups, learners are guided to play games involving numbers and their operations. ● In pairs, learners are guided to carry out combined operations of integers in the correct order. ● In purposive groups, learners are guided to carry out activities	How do we apply integers in daily activities?

			involving positive and negative integers such as reading temperature changes on a thermometer and discussing how to record it. ● In groups, learners are guided to record temperatures above zero degrees Celsius as positive integers. Where possible, record temperatures below zero in degrees Celsius as negative integers. ● In groups, learners are guided to use digital devices or other resources such as print to carry out operations on integers. ● In pairs, learners are guided to play creative games involving integers.	
Core competencies to be developed: ● **Critical thinking and problem solving: Uses creativity in work context** as the learner works out combined operations of integers in the correct order.				

- **Learning to learn: Knows what doing well looks like** as the learner carries out activities such as reading temperature changes in a thermometer and discussing how to record it.
- **Digital literacy: operates digital devices:** as the learners use digital devices to determine temperature.

Values:

- **Respect:** As learners work in groups to carry out activities such as reading temperature changes in a thermometer and discuss how to record it.
- **Unity:** As learners work together in groups towards achieving set goals of reading thermometers.

Pertinent and Contemporary Issues:

- **Life skills and value education:** As learners read and record their body temperatures.

Link to other learning areas:

- The learner is able to relate the skill of reading temperature to the concept of weather changes in Social Studies**.**

Suggested learning resources:

- Number lines, games on charts, number cards, steps, up and down stairs, digital devices

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
1.0 NUMBERS	**1.2 Cubes and Cube Roots** (5 lessons)	By the end of the sub-strand, the learner should be able to; a) sign terms related to cubes and cube roots of numbers, b) work out cubes of numbers by multiplication in different situations, c) determine cubes of numbers from mathematical tables, d) determine cube roots of numbers by factor method in different situations, e) determine cube roots of numbers from mathematical tables, f) work out cubes and cube roots using a calculator, g) apply cubes of numbers in real life situations, h) promote use of cubes and cube roots of numbers in real life situations.	● In pairs, learners are guided to fingerspell and sign terms related to cubes and cube roots of numbers such as cube, cube root. ● In pairs, multiply numbers (nxnxn) to find the cube given the units and use stacks of cubes to demonstrate the concept. ● In the purposive groups, learners are guided to use mathematical tables and digital devices or other resources to demonstrate stacking of cubes. ● In the purposive groups, learners discuss and sign	How do we use cubes and cube roots in real life situations?

			the volume of a container that is a cube and determine both the cube, cube root and relate the two. Ensure learners are seated in an appropriate arrangement that supports clear access of signed discussion. ● In purposive groups, learners are guided to sign read the cube of numbers from mathematical tables and relate to cube roots. ● In purposive groups, learners are guided to use digital devices such as calculators or other resources to determine cube and cube roots of numbers.	

Core competencies to be developed:

- Communication and collaboration: Observing, signing and contributing to a group discussion as the learners work in groups to use stacks of cubes to demonstrate the concept of cube and cube roots of numbers.
- Imagination and creativity: Generates ideas when given clear instruction: as learners determine both the cube and cube root and relate the two.

Values:

- Respect: A learner enhances patience as they appreciate each other's contribution in group discussion on volume of a container that is a cube and determine both the cube and cube root and relate the two.
- Responsibility: A learner enhances diligence as they take care of the digital devices, or any other resources used in learning cubes and cube roots of numbers.

Pertinent and Contemporary Issues: (PCIs):

- Socio-Economic and Environmental Issues: A learner acquires life skills as they relate cubes and volume to packaging and stacking goods.
- Life Skills and Human Sexuality: A learner works out and discusses cube roots and its application in day-to-day life.

Link to other subjects:

- The learner is able to relate the concept of volume taught in mathematics to a similar concept of capacity taught in Pre-Technical Studies.

Suggested learning resources:

- carton boxes, digital devices, multiplication table

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
1.0 NUMBERS	**1.3 Indices and Logarithms** (5 lessons)	By the end of the sub-strand, the learner should be able to: a) sign terms related to indices and logarithms, b) express numbers in index form in different situations, c) derive the laws of indices in different situations, d) apply the laws of indices in different situations, e) relate powers of 10 to common logarithms in different situations, f) reflect on use of indices and logarithms in real life situations.	● In pairs, learners are guided to sign terms such as indices, logarithms, laws of indices, power, base. ● In purposive groups, learners are guided to discuss and relate powers to indices and identify the base. ● In purposive groups, learners are guided to show how to derive the laws of indices using multiplication and division. ● In groups, learners are guided to use the laws of indices to work out indices. ● In purposive groups, learners are guided to discuss and relate powers of 10 to common logarithms. ● In groups, learners are guided to use digital devices or other resources to work out common logarithms.	How do we express numbers in power form?

Core competencies to be developed:

- Communication and collaboration: Understands and respects diversity and contributes to group decision making; A learner recognizes the value of others' ideas as they discuss how to use indices and logarithms of numbers.
- Critical thinking and problem solving: Imagines different situations; A learner develops open mindedness and creativity as they generate and show the laws of indices using multiplication and division.

Values:

- Responsibility: A learner enhances diligence as they use digital devices such as calculators or other resources to work out indices and logarithms of numbers.
- Unity: A learner enriches cooperation as they work in groups during the discussion on indices and logarithms of numbers.

Pertinent and Contemporary Issues:

- Citizenship Education: A learner promotes equity as they use multiplication and division and relate to fair sharing of resources.

Link to other learning areas:

- The learner is able to relate the skill of multiplication and division taught in mathematics to calculations in Pre-technical Studies.

Suggested resource

- Mathematical tables, Calculators.

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
1.0 NUMBERS	**1.4 Compound Proportions and Rates of Work** (8 lessons)	By the end of the sub-strand, the learner should be able to; a) sign vocabularies related to compound proportions and rates of work, b) divide quantities into proportional parts in different situations, c) relate different ratios in real life situations, d) work out compound proportions using the ratio method in different situations, e) calculate rates of work in real life situations, f) appreciate use of compound proportions and rates of work in real life situations.	● In pairs, learners are guided to Fingerspell the vocabulary rates, ratios, proportions and percentages. ● In groups, learners are guided to observe illustrations on compound proportions and rates of work. ● In purposive groups, learners are guided to discuss and divide quantities into proportional parts and express them as a fraction. ● In purposive groups, learners are guided to compare and write different ratios. ● In purposive groups, learners are guided to determine compound proportions using ratios. ● In groups, learners are guided to undertake different tasks, time how long it takes to complete the task and determine the rate of work.	1. How do we express compound proportions in real life situations? 2. Why do we consider the rate of work in day-to-day activities?

			● In groups, learners are guided to play games involving rates of work using digital devices or other resources.	

Core competencies to be developed:

- Critical thinking and problem solving: Explores complex problems by building understanding through research; A learner breaks the problem down into smaller questions as they determine compound proportions using ratios.
- Communication and collaboration: Punctual and reliable for group discussions and supports others in a group; A learner develops teamwork as they discuss and divide quantities into proportional parts and express as a fraction.

Values:

- Responsibility: A learner enriches determination as they undertake tasks in a given time to accomplish tasks in a given time.
- Respect: A learner enhances etiquette as they respect each other while working at different rates.
- Unity: A learner enriches cooperation as they discuss and appreciate dividing quantities into proportional parts.

Pertinent and Contemporary Issues:

- Life Skills and Human Sexuality: Self-esteem; A learner enhances responsibility as they devise personal strategies to divide quantities into proportional parts.

Link to other learning areas:

- The learner is able to relate the concept of division to similar concepts of quantities in Agriculture and Nutrition.

Suggested learning resources:

- Digital clocks, course book, multiplication table

Suggested Assessment Rubric

Level / Indicator	Exceeds Expectation	Meets Expectation	Approaches Expectation	Below Expectation
Ability to sign terms related number concepts	Signs all terms related number concepts including less common terms with precision and correct non manual signals	Signs terms related number concepts with appropriate manual signals	Signs terms related number concepts with some specific categories or miss less obvious terms.	Signs terms related number concepts with limitations relying on fingerspelling to sign some terms
Ability to perform combined operations on integers.	Performs combined operations on integers demonstrating a clear understanding of the concept.	Performs combined operations on integers.	Performs combined operations on integers but demonstrates partial understanding of the correct order of operation.	Performs combined operations on integers but demonstrates little to no understanding of the correct order of operation.

Ability to determine cubes of numbers by multiplication and from mathematical tables and by use of calculators.	Determines cubes of numbers by multiplication and from mathematical tables and by calculators and relates them.	Determines cubes of numbers by multiplication, from mathematical tables and by use of calculators.	Determines cubes of numbers by multiplication and from mathematical tables and by use of calculators with occasional errors.	Determines cubes of numbers by multiplication and from mathematical tables and by use of calculators with little to no accuracy.
Ability to determine cube roots of numbers by factor method and from mathematical table and by calculator in	Determines cube roots of numbers by factor method and from mathematical tables and by calculator in different situations and relate them.	Determines cube roots of numbers by factor method, from mathematical tables and by calculator in different situations.	Determines cube roots of numbers by factor method and from mathematical tables and by calculator in different situations with occasional errors.	Determines cube roots of numbers by factor method and from mathematical tables and by calculator in different situations with little to no accuracy.

different situations.				
Ability to derive the laws of indices in different situations.	Derives the laws of indices in different situations showcasing a systematic approach.	Derives the laws of indices in different situations.	Derives the laws of indices partially in different situations.	Derives the laws of indices partially in different situations with struggles.
Ability to work out compound proportions and rates of work in real life situations.	Works out compound proportions and rates of work in real life situations showing in depth understanding of the concept.	Works out compound proportions and rates of work in real life situations.	Works out compound proportions and rates of work in real life situations with incomplete solutions.	Works out compound proportions and rates of work in real life situations with incorrect solutions.

STRAND 2.0: ALGEBRA

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
2.0 ALGEBRA	**2.1 Matrices** (8 lessons)	By the end of the sub-strand, the learner should be able to**:** a) sign terms related to matrices, b) identify a matrix in different situations, c) determine the order of a matrix in different situations, d) determine the position of items in a matrix in different situations, e) determine compatibility of matrices in addition and subtraction, f) carry out addition of matrices in real life situations, g) carry out subtraction of matrices in real life situations,	● In groups, learners are guided to fingerspell and sign terms related to matrices. ● In groups, learners are guided to identify situations where the matrix is applied. ● In groups, learners are guided to discuss the use of tables such as football league tables, travel schedules, shopping lists and any other. Count the number of rows and columns in the table, which is a matrix. ● In groups, learners are guided to organise objects in rows and columns and give the order of the matrix in terms of row and columns (row **x** column y). ● In groups, learners are guided to discuss, sign and identify the position of each item or element in terms of row and column.	How do we use matrices in real life situations?

		h) reflect on the use of matrices in real life situations.	● In purposive groups, learners are guided to discuss and identify matrices that have equal number of rows and equal number of columns (same order) for compatibility in addition and subtraction. ● In purposive groups, learners are guided to discuss and note what is represented by the rows and what is represented by the columns from two or more matrices to carry out addition or subtraction.	

Core competencies to be developed:

- Communication and collaboration: Understands and respects diversity; A learner speaks clearly and effectively using appropriate language as they discuss use of tables to represent matrices.
- Learning to learn: Sets own goal; A learner reflects on their own experience as they arrange items or elements in rows and columns to form matrices.
- Integrity: A learner enhances discipline as they organise objects in rows and columns and give the order of the matrix.

Pertinent and Contemporary Issues:

- Socio-Economic and Environmental Issues: Social and economic issues; A learner discusses the use of tables such as football league tables and shopping lists.

Link to other learning areas:

The learner is able to relate the skill of matrices to a similar concept of generating tables of results in sports and refers to league schedules in Creative Arts.

Suggested learning resources:

- marbles, Counters, multiplication table

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Question(s)
2.0 ALGEBRA	**2.2 Equations of a Straight Line** (15 lessons)	By the end of the sub-strand the learner should be able to; a) sign vocabularies related to equations of a straight line in real life situation, b) identify the gradient in real life situation, c) determine the gradient of a line from two known points, d) determine the equation of a straight line given two points, e) determine the equation of a straight line from a known point and a gradient, f) express the equation of a straight line in the form of $y = mx + c$, g) interpret the equation $y = mx + c$ in different situations, h) determine the x and y intercepts of a straight line,	● In pairs, learners are guided to sign the vocabulary related to equations such as: equation, straight line, gradient, variables, constant, intercept, and slope. ● In purposive groups, learners are guided to discuss steepness in relation to gradient in the immediate environment. ● In purposive groups, learners are guided to incline a ladder at different positions on the wall to demonstrate changes in the steepness of the gradient. Discuss and compare the positions at which the ladder is steeper. ● In groups, learners are guided to observe and climb up and down places such as stairs or	How do we use gradient or steepness in our daily activities?

		i) recognise the use of equations of straight lines in real life.	hills and relate them to gradients. ● In purposive groups, learners are guided to work out the equation of a straight line given two points or given a point and a gradient. ● In purposive groups, learners are guided to discuss and rewrite the equation of a straight line as y=mx+c. ● In purposive groups, learners are guided to explain the variables and constants in the equation. ● In purposive groups, learners are guided to work out the value of x when y is zero and the value of y when x is zero. ● In groups, learners are guided to use digital devices or other resources to show different	

			hills and mountains and discuss steepness.	

Core competencies to be developed:

- Digital literacy: Operates digital devices and uses the internet; A learner accesses learning materials using digital devices with assistive technology or other resources to explore steepness or gradients of places.
- Learning to learn: Sets their own goal; A learner builds on their own learning experiences as they place the ladder at different points on the ground while discussing and comparing steepness.

Values:

Integrity: A learner enhances discipline as they observe gradient/steepness in staircases in buildings, bridges or ramps.

Pertinent and Contemporary Issues:

- Socio-Economic and Environmental Issues: Safety and security; A learner promotes awareness as they climb up and down places such as the stairs or hills and relate to gradients.

Link to other learning areas:

- Integrated Science: A learner uses the ladder to make work easier by using different gradients.

Suggested resources

- Rulers, drawing tools, graph papers/ squared books, ladder, pictures

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
2.0 ALGEBRA	**2.3 Linear Inequalities** (6 lessons)	By the end of the sub-strand the learner should be able to; a) sign terms and symbols related to linear inequalities, b) solve linear inequalities in one unknown, c) represent linear inequalities in one unknown graphically, d) represent linear inequality in two unknowns graphically, e) apply linear inequalities to real life situations, f) reflect on the use of linear inequalities in real life.	● In groups, learners are guided to identify and sign the correct symbols to be used in forming linear inequality. ● In groups, learners are guided to discuss why sometimes resources are shared unequally. ● In groups, learners are guided to discuss simple inequality statements, form and work out the inequalities in one unknown. ● In purposive groups, learners are guided to discuss and generate a table of values and draw linear inequalities in one unknown. Indicate and discuss the region that satisfies the inequalities. ● In purposive groups, learners are guided to discuss and generate a table of values and draw linear inequalities in two unknowns. Indicate and discuss the region that satisfies the inequalities.	1. How do we represent linear inequalities in graphs? 2. How do we use linear inequalities in real life situations?

			● In groups, learners are guided to discuss and work out linear inequalities that involve real life cases. ● In groups, learners are guided to use digital devices or other graphing tools to present linear inequalities.	
Core competencies to be developed: ● Communication and collaboration: Signing, observing and writing; A learner signs with clarity and effectively by making several points in logical order as they discuss and generate a table of values and draw linear inequalities.				
Values: ● Social justice: A learner enhances fairness as they apply concepts of inequalities and equity in sharing available resources in real life situations.				
Pertinent and Contemporary Issues: ● Citizenship Education: A learner discusses and indicates the regions that satisfy inequalities.				
Link to other learning areas: The learner is able to relate the concept of inequality in mathematics to inequality statements that may involve distribution of resources in Social Studies.				
Suggested learning resources: ● Calculators, digital devices, balance scales, course books				

Suggested Assessment Rubric

Level / Indicator	Exceeds Expectation	Meets Expectation	Approaches Expectation	Below Expectation
Ability to sign terms related algebra	Signs all terms related algebra including less common terms with precision and correct non manual signals	Signs terms related algebra with appropriate manual signals	Signs terms related algebra with some specific categories or miss less obvious terms.	Signs terms related algebra with limitations relying on fingerspelling to sign some terms
Ability to carry out addition and subtraction of matrices in real life situations.	Carries out addition and subtraction of matrices in complex real life situations	Carries out addition and subtraction of matrices in real life situations.	Carries out addition and subtraction of matrices in real life situations with limited success in providing accurate solutions.	Carries out addition and subtraction of matrices in real life situations with inadequate solutions.
Ability to determine the gradient and the equation of a line from two known points.	Determines the gradient and the equation of a line from two known points and relates it to the slope of line.	Determines the gradient and the equation of a line from two known points.	Determines the gradient and the equation of a line from two known points with minor errors.	Determines the gradient and the equation of a line from two known points with frequent errors.

Ability to represent linear inequalities in one and two unknowns graphically.	Represents linear inequalities in one and two unknowns graphically with in depth understanding of inequalities representation.	Represents linear inequalities in one and two unknowns graphically.	Represents linear inequalities in one and two unknowns graphically with minor errors in plotting.	Represents linear inequalities in one and two unknowns graphically with significant errors in plotting.

STRAND 3.0: MEASUREMENTS

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
3.0 MEASUREMENTS	**3.1 Area** (8 lessons)	By the end of the sub-strand, the learner should be able to; a) sign the terms related to the area of figures, b) calculate the area of a pentagon and a hexagon in different situations, c) work out the surface area of triangular and rectangular based prisms, d) work out the surface area of triangular, rectangular and square-based pyramids, e) calculate the area of a sector and segment of a circle,	• In groups, learners are guided to sign the terms such as area, spheres, cones/funnels, net, pyramids, prisms, and frustums, segment of a circle, surface area of a prism, triangular and rectangular-based prisms. • In purposive groups, learners are guided to discuss the properties of regular polygons. • In groups, learners are guided to use cut-outs to work out the area of pentagons and hexagons. • In groups, learners are guided to collect objects from the environment that are spheres, cones/funnels, pyramids, prisms, and frustums.	How do we determine the area of different surfaces?

		f) work out the surface area of a cone in real life situations, g) calculate the surface area of a sphere in real life situations, h) recognise the use of area in real life situations.	• In purposive groups, learners are guided to discuss and sketch the nets of the solids. • In groups, learners are guided to use models of prisms to work out the surface area of prisms. • In groups, learners are guided to open up the net and draw the faces of a pyramid. • In purposive groups, learners are guided to use the relevant formula for the area of plane figures to work out the surface area of the pyramid. • In groups, learners are guided to draw a circle with a sector, a chord, and a segment. • In groups, learners are guided to discuss the relationship and make cut-outs of a sector and a segment. • In pairs, learners are guided to determine the area of a sector and a segment.	

			● In pairs, learners are guided to open the cone to form a net and determine the curved surface area of a cone. ● In pairs, learners are guided to work out the surface area of a closed and an open cone. ● In groups, learners are guided to use relevant formulas to work out the surface area of different sizes of spherical balls. ● In groups, learners are guided to use digital devices or other resources to sketch different models and nets.	

Core competencies to be developed:

- Communication and collaboration: understands and respects diversity; A learner improves the team by not creating unnecessary conflicts and resolving conflicts as they work in groups to discuss the properties of regular polygons and use cut-outs to work out the area of pentagon and hexagon.
- Creativity and imagination: Uses creativity in work context; A learner develops originality skills as they open nets of different models and work out

Values:

- Responsibility: A learner enhances diligence as they take care and work out surface area using models and open nets of different objects.

Pertinent and Contemporary Issues: ● Citizenship Education: Patriotism; A learner promotes loyalty as they collect objects from the environment, use and dispose of them safely.
Link to other learning areas: The learner is able to relate the skill of polygons to the concept of making open nets of different objects in Pre-Technical Studies.
suggested learning resources Square cut-outs, squares, writing materials

Strand	Sub-Strand	Specific Learning Outcome	Suggested Learning Experiences	Suggested key Inquiry Questions
3.0 MEASUREMENTS	**3.2 Volume of Solids** (8 lessons)	By the end of the sub-strand, the learner should be able to; a) sign terms related to volume of different shapes, b) work out the volume of a triangular and rectangular based prisms, c) calculate the volume of a triangular, rectangular and square-based pyramids, d) work out the volume of a cone in real life situations, e) determine the volume of a frustum in real life situations, f) calculate the volume of a sphere in real life situations,	● In groups, learners are guided to collect different containers and objects. These may include prisms, pyramids, cones, funnels and balls. ● In groups, learners are guided to fingerspell and sign terms related to volume ● In groups, learners are guided to discuss the model of a prism and its use. Using the relevant formula, determine the volume of a prism. ● In groups, learners are guided to use relevant formulas to work out the volume of pyramids and cones. ● In groups, learners are guided to identify and work out the volume of models of a pyramid. Cut the pyramid into two parts to get a	1. How do we determine the volume of different solids? 2. How do we use the volume of solids in real life situations?

		g) promote use of volume and capacity of different containers in real life situations.	frustum and a small pyramid and determine the volume of the frustum using the relevant formula. ● In groups, learners are guided to play any games involving different sizes of balls and work out the volume of a sphere. ● In groups, learners are guided to use digital devices or other resources to determine the volumes of solids.	
Core competencies to be developed: ● Critical thinking and problem solving: Explores complex problems by building understanding through research. A learner explores the link between different events as they identify and work out the volume of a frustum from a pyramid.				
Values: ● Responsibility: A learner enriches determination as they take care of the models of pyramids, cones, and spheres. ● Patriotism: A learner enhances citizenship as they collect objects from the environment to determine and discuss models/objects for different volumes of solids.				
Pertinent and Contemporary Issues: ● Socio-Economic and Environmental Issues: Environmental education; A learner appreciates the gift of nature as they take care of the environment while collecting the containers and objects. ● Safety and security**:** A learner collects containers and objects cautiously.				

Link to other learning areas: Creative Arts and Sports: The learner is able to relate the skill of making pyramids, cones and funnels to apparatus used as sports equipment in Creative Arts and Sports.
Suggested learning resources: ● Digital devices, realia, course books, pictures.

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Question(s)
3.0 MEASUREMENTS	**3.3 Mass, Volume, Weight and Density** **(**8 Lessons**)**	By the end of the sub-strand, the learner should be able to: a) Sign the terms related to mass, volume, weight and density, b) convert units of mass from one form to another in different situations, c) relate mass and weight in real life situations, d) determine mass, volume and density in different situations, e) apply density to real life situations, f) recognise the use of density in daily life.	● In groups, learners are guided to finger spell and sign terms related to mass, volume, weight, and density, such as grams, kilograms, and weighing machines. ● In purposive groups, learners are guided to discuss different instruments and tools used in weighing materials or objects and relate them to consumer awareness and protection. ● In purposive groups, learners are guided to collect and weigh different materials or objects and convert units of mass. ● In pairs, learners are guided to discuss the relationship between mass and weight. ● In groups, learners are guided to carry out activities relating mass and volume to density using containers or different substances.	How do you weigh materials and objects?

			In groups, learners are guided to discuss and find the density of different materials or objects. ● In groups, learners are guided to work out mass, volume, and density using digital devices or other resources.	
Core competencies to be developed: ● Communication and collaboration: Signing, observing and writing; As the learner engage in group discussion using facts and examples to support points when they are discussing the relationship between mass and weight. ● Learning to learn: Knows what doing well looks like; A learner organises their own learning as they collect and weigh different materials or objects and change one unit of mass to another.				
Values: ● Integrity: A learner enhances discipline as they give correct mass and weights of different material and objects. ● Responsibility: A learner enhances diligence as they work and take care of weighing machines and other resources.				
Pertinent and Contemporary Issues: ● Life Skills and Human Sexuality: Self-awareness; A learner weighs themselves for health purposes.				
Link to other learning areas: The learner is able to relate the concept of weights and measures to concepts of measuring chemicals and ingredients in Agriculture and Nutrition.				
Suggested learning resource Solids such as prisms, pyramids, cones, spheres				

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
3.0 MEASUREMENTS	**3.4 Time, Distance and Speed** (10 lessons)	By the end of the sub-strand, the learner should be able to: a) sign terms related to measuring speed, distance, and time, b) work out speed in km/h and m/s in real life situations, c) work out average speed in real life situations, d) determine velocity in real life situations, e) work out acceleration in real life situations, f) identify the longitudes on the globe, g) relate longitudes to time on the globe, h) determine local time of places on the earth along different longitudes,	● In pairs, learners are guided to sign terms related to speed, distance, and time. ● In groups, learners are guided to engage in activities that involve measuring distances and time, for example running track events to determine speed. ● In pairs, learners are guided to discuss and relate distance and time. ● In purposive groups, learners are guided to discuss the difference between velocity and speed. ● In groups, learners are guided to discuss and determine acceleration from track events in school or the community. ● In purposive groups, learners are guided to identify main	1. How do we observe speed in daily activities? 2. Why does time vary in different places of the world?

		i) appreciate the use of time and distance in real life situations.	longitudes using the globe and time zones. ● In purposive groups, learners are guided to discuss and use maps and models of a globe to work out and relate time of different places on the earth. ● In groups, learners are guided to use digital devices to watch videos on the globe, longitudes and time zones in different parts of the earth. ● In groups, learners are guided to use other resources such as maps to locate different places (cities) on the earth and discuss time differences.	
Core competencies to be developed: ● Critical thinking and problem solving: Completes tasks by following instruction; A learner describes the procedure to be followed when measuring distances and time, for example running track events to determine speed ● Creativity and imagination: Imagines different situations; A learner studies the instructions before working out and relate time of different places on the earth				
Values: ● Integrity: A learner enhances discipline as they correctly record individual running time during track events and other games. ● Respect: A learner enhances etiquette as they adhere to their lanes on track events and other games.				

Pertinent and Contemporary Issues: ● Safety and security: A learner observes safety measures and time during games and sports. ● Education for Sustainable Development (ESD): A learner participates and chooses careers in games and sporting activities. ● Self-awareness: A learner participates and times themselves in games.
Link to other learning areas: ● Integrated Science: A learner uses digital devices to tell time in different zones of the world.
Suggested learning Resources: digital devices, maps, globes, digital clocks.

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
3.0 MEASUREMENTS	**3.5 Money** (7 lessons)	By the end of the sub-strand, the learner should be able to; a) sign the vocabularies related to money for exchange, b) identify currencies that are used in different countries, c) convert currency from one form to another in real life situations, d) work out import and export duties charged on goods and services, e) work out excise duty charged on goods and services, f) determine value added tax (VAT)	● In groups, learners are guided to fingerspell and sign the terms money, currency, US dollars, Euro, Yen, Tsh, Ush, South African Rand, Sterling pound, excise duty, and VAT. ● In purposive groups, learners are guided to use digital devices or other resources to obtain and compile a collage of currencies from different countries. For example, currencies of East African countries, US dollars, Euro, Yen and Sterling pound. ● In purposive groups, learners are guided to work out currency exchange from Kenya shillings to any other currency and vice versa. ● In purposive groups, learners are guided to discuss and	1. Why do we change currencies from one form to another? 2. Why does the government charge tax and levies?

		charged on goods and services, g) appreciate use of money in day-to-day activities.	determine the export and import duty charges on different goods. ● In groups, learners are guided to discuss and identify goods that attract excise duty and determine excise duty. ● In groups, learners are guided to use receipts from shopping to discuss and work out VAT on goods and services. ● In groups, learners are guided to identify currency exchange rates from different sources, including daily papers, digital devices, and financial institutions, and relate this to consumer awareness and protection.	

Core competencies to be developed:

- Critical thinking and problem solving: Explores complex problems by building understanding through research; as the learner carries out research to build their understanding when compiling a collage of currencies from different countries.
- Citizenship: Recognizes own strengths and weaknesses**;** as the learner demonstrates interest and interacts with others as they discuss and determine the export and import duty charges on different goods.

Values: ● Integrity: A learner enhances accountability as they accurately work out currency, import and exchange rates. ● Social cohesion: A learner promotes coexistence as they work and appreciate exchange rates for other countries.
Pertinent and Contemporary Issues: ● Life Skills and Human Sexuality: Self-Awareness; A learner acquires life skills as they choose careers in business, imports and exports. ● Citizenship Education: Ethnic & Racial Relations; the learner develops honesty as they learn about different currencies of the world.
Link to other learning areas: ● Pre-Technical Studies: A learner works out VAT and currency exchange.
Suggested learning resources dummies, paper cut out of foreign currencies

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Question(s)
3.0 MEASUREMENTS	**3.6 Approximations and Errors** **(**5 lessons**)**	By the end of the sub-strand, the learner should be able to; a) sign words related to approximation of errors, b) approximate quantities in measurements in different situations, c) determine errors using estimations and actual measurements of quantities, d) determine percentage errors using actual measurements of quantities, e) appreciate approximations and	● In groups, learners are guided to fingerspell, sign and carry out activities of measurements of different quantities such as length, area, volume, capacity and mass using arbitrary units. ● In pairs, learners are guided to estimate and measure different quantities using appropriate instruments. They compare the estimates and the actual measurements and determine the error. ● In purposive groups, learners are guided to work out the percentage error from the estimated and the actual measurements. ● In groups, learners are guided to work out errors using digital devices or other	How do we estimate measurements of different quantities?

		errors in real life situations.	resources and relate this to consumer awareness.	
Core competencies to be developed: ● Creativity and imagination: Uses creativity in work context; A learner undertakes group tasks and gains new perspectives on how to measure different quantities such as length, area, volume, capacity and mass.				
Values: ● Integrity: A learner enhances accountability as they measure different quantities and minimise errors. ● Responsibility: A learner enhances accountability as they take care of tools for measuring different quantities.				
Pertinent and Contemporary Issues: ● Safety and security: A learner handles measuring tools with care.				
Link to other learning areas: ● Integrated Science: A learner measures different quantities while carrying out experiments.				
Suggested learning Resources: ● Digital devices, realia, ruler, course book				

Suggested Assessment Rubric

Level / Indicator	Exceeds Expectation	Meets Expectation	Approaches Expectation	Below Expectation
Ability to sign terms related to measurements.	Signs all terms related to measurements including less common terms with precision and correct non manual signals.	Signs terms related to data measurements with appropriate manual signals.	Signs terms related to measurements with some specific categories or miss less obvious terms.	Signs terms related to measurements with limitations relying on fingerspelling to sign some terms.
Ability to calculate the area of 3-D objects in real life situations.	Calculates area of 3-D objects in real life situations utilising different methods.	Calculates area of 3-D objects in real life situations.	Calculates area of 3-D objects in real life situations with inaccuracies in solutions.	Calculates area of 3-D objects in real life situations with incomplete solutions.
Ability to calculate volume of 3-D objects in real life situations.	Calculates volume of 3-D objects in real life situations utilising different methods.	Calculates volume of 3-D objects in real life situations.	Calculates volume of 3-D objects in real life situations with inaccuracies in solutions.	Calculates volume of 3-D objects in real life situations with incomplete solutions.

Ability to determine mass, volume and density in different situations.	Determines mass, volume and density in different situations demonstrating a deep understanding of concepts and their interrelationships.	Determines mass, volume and density in different situations.	Determines mass, volume and density in different situations but struggles with more complex problems.	Determines mass, volume and density in different situations but shows limited understanding of concept.
Ability to determine velocity and acceleration in real life situations.	Determines velocity and acceleration in real life situations with deeper understanding of their units of measurement.	Determines velocity and acceleration in real life situations.	Determines velocity and acceleration in real life situations but lacks accuracy in solutions.	Determines velocity and acceleration in real life situations with incorrect application of concepts.
Ability to determine local time of places on the earth along different longitudes	Determines local time of places on the earth along different longitudes and time zones.	Determines local time of places on the earth along different longitudes.	Determines local time of places on the earth along different longitudes occasionally making errors.	Determines local time of places on the earth along different longitudes frequently making errors.

Ability to convert currency from one form to another in real life situations	Converts currency from one form to another in real life situations and relates them to the countries.	Converts currency from one form to another in real life situations.	Converts currency from one form to another partially in real life situations.	Converts currency from one form to another partially in real life situations even with prompts.
Ability to determine errors using estimations and actual measurements of quantities.	Determines errors using estimations and actual measurements of quantities demonstrating in depth understanding of the concept.	Determines errors using estimations and actual measurements of quantities.	Determines errors using estimations and actual measurements of quantities but lacks depth in analysis.	Determines errors using estimations and actual measurements of quantities with limited abilities to solve problems.

STRAND 4.0: GEOMETRY

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
4.0 GEOMETRY	**4.1 Coordinates and Graphs** (6 lessons)	By the end of the sub strand, the learner should be able to; a) use signs related to coordinate and graphs, b) plot out points on a Cartesian plane, c) draw a straight line graph given an equation, d) draw parallel lines on the Cartesian plane, e) relate the gradients of parallel lines, f) draw perpendicular lines on the Cartesian plane, g) relate the gradients of perpendicular lines, h) apply graphs of straight lines in real life situations.	● In groups, learners are guided to identify, fingerspell and sign vocabularies related to coordinates and graphs. ● In groups, learners are guided to work together and draw a Cartesian plane then locate the point of intersection of the x coordinate and the y- coordinates. ● In groups, learners are guided to generate a table of values from the equation of a straight line given a$\geq x \geq b$, plot and join the points to form a straight line. ● In groups, learners are guided to generate a table of values for each of the given equations, plot and join them to form straight lines on the Cartesian plane. ● In purposive groups, learners are guided to work out the gradients of each of the lines using the formulas	1. How do we draw graphs of straight lines? 2. How do we interpret graphs of straight lines?

			$\frac{y-y_,}{x-x_,}$ and compare them to establish the relationship of parallel lines. ● In purposive groups, learners are guided to generate a table of values for each of the given equations of perpendicular lines, plot and join them to form straight lines on the Cartesian plane. ● In purposive groups, learners are guided to work out the gradients of each of the lines and compare them to establish the relationship of perpendicular lines.	
Core Competencies to be developed: ● Communication and Collaboration: Observing, signing, and contributing to group decision making; as the learner listens critically as they work in groups to locate the point of intersection of straight lines. ● Critical thinking and problem solving: Completes tasks by following instructions; as the learner follows instructions to complete tasks as they generate a table of values from equations of a straight line.				
Values: ● Responsibility: A learner enriches determination as they take care of graphing instruments and other resources.				
Pertinent and Contemporary Issues: ● Life Skills and Human Sexuality: Critical & Creative Thinking; the learner acquires life skills as they generate tables of values and draw graphs of straight lines. ● Socio-Economic and Environmental Issues: Safety and Security: a learner enhances caution as they handle graphing instruments with sharp ends.				

Link to other learning areas: ● Integrated Science: A learner plots graphs of straight lines in different quantities.
Suggested learning resources: ● graph books, graph paper, ruler, course book

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
4.0 GEOMETRY	**4.2 Scale Drawing** (14 lessons)	By the end of the sub-strand, the learner should be able to: a) sign terms related to scale drawing in different situations, b) identify compass and true bearings in real life situations, c) determine the bearing of one point from another in real life situations, d) locate a point using bearing and distance in real life situations, e) identify angles of elevation in real life situations, f) determine angles of elevation in different situations, g) identify angles of depression in real life situations. h) determine angles of depression in different situations,	● In pairs, learners are guided to observe a signed video clip or a video with captions on bearings and angles of elevation and depression. ● In pairs, learners are guided to practice signing vocabulary related to compass direction, True North bearing, distance, angle of elevation, angle of depression, and surveying. ● In purposive groups, learners are guided to draw and discuss compass directions and their relation to compass and True North bearings. ● In purposive groups, learners are guided to discuss and locate places from different points using bearings.	How do we use scale drawing in real life?

		i) apply scale drawing in simple surveying, j) appreciate the use of scale drawing in real life situations.	● In purposive groups, learners are guided to discuss and locate a place using bearing and distance. ● In purposive groups, learners are guided to sketch and use scale drawing to show the position of places from given points. ● In groups, learners are guided to carry out different activities involving angles of elevation, such as observing different objects or points that are above. ● In groups, learners are guided to discuss, sketch and make a scale drawing to determine the angles of elevation. ● In groups, learners are guided to carry out different activities involving angles of depression, such as observing different objects or points that are below. ● In groups, learners are guided to discuss, sketch and make a scale drawing to determine the angles of depression.	

			● In groups, learners are guided to discuss and use scale drawings in simple surveying. ● In groups, learners are guided to observe maps or watch signed or captioned videos on bearings and simple surveying.	
Core competencies to be developed: ● Learning to learn: Sets own goals; as the learner builds their own learning experience by sketching/manipulating tactile sketches and determining angles of elevation and depression.				
Values: ● Unity: A learner enriches cooperation as they sketch and agree on points in simple surveying. ● Social cohesion: A learner promotes coexistence as they observe maps and watch videos on land surveying.				
Pertinent and Contemporary Issues: ● Life Skills and Human Sexuality: Critical & Creative Thinking; as the learner discusses with others and locates places from different points using bearings.				
Link to other learning areas: ● Social Studies: A learner works in groups to observe maps in surveying.				
Suggested learning resources ● Pair of compasses, rulers, straight edges				

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
4.0 GEOMETRY	**4.3 Similarity and Enlargement** (10 lessons)	By the end of the sub-strand, the learner should be able to; a) sign the terms related to similarity and enlargement in different situations, b) identify similar figures and their properties, c) draw similar figures in different situations, d) determine properties of enlargement of different figures, e) apply properties of enlargement to draw similar objects and their images, f) determine the linear scale factor of similar figures, g) promote use of similarity and enlargement in real life situations.	● In pairs, learners are guided to watch a signed or captioned video clip on similarity and enlargement. ● In pairs, learners are guided to sign the vocabulary similarity, enlargement, similar, objects, image, linear scale factor, centre of enlargement. ● In groups, learners are guided to collect objects and sort them according to similarity. ● In purposive groups, learners are guided to discuss sign and note down properties of similar objects. ● In purposive groups, learners are guided to use	1. How are objects similar? 2. How do we use enlargement in real life situations?

			properties of similar objects to scale-draw similar figures. ● In purposive groups, learners are guided to discuss and identify properties of enlargement. ● In groups, learners are guided to use properties of enlargement to represent objects and their images. ● In groups, learners are guided to determine the linear relationship of similar figures and objects. ● In groups, learners are guided to enlarge objects and figures using digital devices.	
Core Competencies to be developed: ● Critical thinking and problem solving: Generates ideas when to improve something; as the learner develops open mindedness and creativity as they draw similar and enlarged objects and figures.				

● Digital literacy: Operates digital devices; a learner uses digital devices, software and services to effectively enlarge objects and figures.
Values: ● Responsibility: A learner enriches determination as they collect similar objects and take care of them in the learning process. ● Social cohesion: A learner enhances co-existence as they work in groups to draw similar objects and figures.
Pertinent and Contemporary Issues: ● Socio-Economic and Environmental Issues: Environmental education; as the learner appreciates the gift of nature as they collect similar objects from the environment
Link to other learning areas: ● Environmental education: A learner appreciates the gift of nature as they collect similar objects from the environment
Suggested learning resources Similar containers, objects of different sizes

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
4.0 GEOMETRY	**4.4 Trigonometry** (8 lessons)	By the end of the sub-strand, the learner should be able to; a) sign terms related to trigonometric ratios, b) identify angles and sides of right-angled triangles in different situations, c) identify Sine, Cosine and Tangent ratios from a right-angled triangle in different situations, d) read tables of trigonometric ratios for acute angles, e) determine trigonometric ratios of acute angles using calculators, f) apply trigonometric ratios to calculate lengths and angles of right-angled triangles in different situations, g) appreciate the use of trigonometric ratios in real life situations.	• In groups, learners are guided to observe a signed or captioned video illustrating sines, cosines, tangents, opposite sides, adjacent sides, hypotenuses, acute angles, trigonometric ratios, and right-angled triangles. • In groups, learners are guided to sign the following vocabulary: sines, cosines, tangents, opposite sides, adjacent sides, hypotenuses, acute angles, trigonometric ratios, and right-angled triangles. • • In groups, learners are guided to draw right-angled triangles and recognise angles and sides. Discuss and sign the relationship between angles and sides.	How are trigonometric ratios important?

			● In groups, learners are guided to sign-read and relate the trigonometric ratios to angles in a right-angled triangle. ● In groups, learners are guided to use trigonometric ratios to determine the lengths and angles of right-angled triangles. ● In groups, learners are guided to use mathematical tables or digital devices to find the trigonometric ratios of given angles.	
Core competencies to be developed: ● Critical thinking and problem solving: Uses creativity in work context; as the learner develops open mindedness and creativity.				
Values: ● Responsibility: As learners take care of digital devices, mathematical tables and drawing materials.				
Pertinent and Contemporary Issues: ● Socio-Economic and Environmental Issues: Safety and Security; As learners plug and use digital devices				
Link to other learning areas: ● Pre-Technical Studies: As learners draw right-angled triangles and recognise angles and sides.				
Suggested learning resources ● Pair of compasses, rulers, straight edges				

Suggested Assessment Rubric

Level / Indicator	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to sign terms related geometry	Signs all terms related geometry including less common terms with precision and correct non manual signals	Signs terms related data geometry with appropriate manual signals	Signs terms related to geometry with some specific categories or miss less obvious terms.	Signs terms related geometry with limitations relying on fingerspelling to sign some terms
Ability to plot out points on a Cartesian plane	Plots out points on a Cartesian plane with precision.	Plots out points on a Cartesian plane.	Plots out points on a Cartesian plane with minor deviations.	Plots out points on a Cartesian plane with major deviations.

Ability to determine angles of elevation and depression in different situations.	Determines angles of elevation and depression in different situations considering multiple factors and varying situations.	Determines angles of elevation and depression in different situations.	Determines angles of elevation and depression in different situations with occasional gaps in understanding.	Determines angles of elevation and depression in different situations with frequent gaps in understanding.
Ability to determine the linear scale factor of similar figures.	Determines the linear scale factor of similar figures in various contexts.	Determines the linear scale factor of similar figures.	Determines the linear scale factor of similar figures but lacks accuracy in solutions.	Determines the linear scale factor of similar figures with incorrect solutions.

Ability to apply trigonometric ratios to calculate lengths and angles of right-angled triangles in different situations	Applies trigonometric ratios to calculate lengths and angles of right-angled triangles in different situations showing the interrelationships between the ratios.	Applies trigonometric ratios to calculate lengths and angles of right-angled triangles in different situations.	Applies trigonometric ratios to calculate lengths and angles of right-angled triangles in different situations with occasional gaps.	Applies trigonometric ratios to calculate lengths and angles of right-angled triangles in different situations with significant gaps.

STRAND 5.0: DATA HANDLING AND PROBABILITY

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
5.0 DATA HANDLING AND PROBABILITY	**5.1 Data Interpretation (Grouped Data)** (8 lessons)	By the end of the sub-strand, the learner should be able to; a) sign terms related to data interpretation for effective communication, b) determine appropriate class width for grouping data, c) draw frequency distribution tables of grouped data, d) identify the modal class of grouped data, e) calculate the mean of a grouped data from real life situations, f) determine the median of a grouped data from real life situations, g) appreciate data interpretation in real life situations.	● In pairs, learners are guided to fingerspell and sign terms related to data interpretation such as data, frequency, frequency distribution, mean, mode, and modal class among other terms. ● In purposive groups, learners are guided to tally the data and represent it in a frequency distribution table. ● In purposive groups, learners are guided to recognise the modal class from a set of grouped data. ● In purposive groups, learners are guided to work out the mean from different sets of grouped data. ● In purposive groups, learners are guided to use the frequencies to determine the median class of grouped data. ● In groups, learners are guided to work out the median from different sets of grouped data.	How do we interpret data?

			● In groups, learners are guided to use digital devices or other materials to determine the mean and median of grouped data.	

Core competencies to be developed:

- Learning to learn: Knows what doing well looks like; as the learner develops independence when they collect, organise and interpret data.
- Communication and collaboration: Contributes to group decision making; as the learner contributes to group decision making by discussing and determining the modal class, mean and median of grouped data.
- Digital literacy: Operates digital devices; as the learner develops interaction with technology by using digital or other materials to determine the mean and median of grouped data.

Values:

- Respect: A learner enhances patience as they work together in groups to collect data from the immediate environment

Pertinent and Contemporary Issues:

- Citizenship Education: Good Governance; as the learner develops responsibility as they collect data that may relate to the population.
- Socio-Economic and Environmental Issues; Education for Sustainable Development (ESD): the learner develops life skills as they choose career paths in statistics and other related fields.

Link to other learning areas:

- Integrated Science: A learner interprets data related to different organisms and materials.
- Social Studies: A learner analyses and interprets data in different social aspects.

Suggested learning resources

- Data from different sources

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested key Inquiry Questions
5.0 DATA HANDLING AND PROBABILITY	**5.2 Probability** **(**6 lessons)	By the end of the sub-strand, the learner should be able to; a) sign vocabularies related to probability in different situations, b) perform experiments involving equally and likely outcomes in different situations, c) determine the range of probability of an event, d) identify mutually exclusive events in real life situations, e) perform experiments of single chance involving mutually exclusive events f) perform experiments involving independent events in different situations, g) draw a tree diagram for a single outcome,	● In pairs, learners are guided to fingerspell and sign the terms; probability, experimental probability, outcome, likely events, probability range, event, mutually exclusive, independent events and tree diagram. ● In groups, learners are guided to discuss and carry out experiments of events involving equally and likely outcomes. ● In groups, learners are guided to work out the r probability range of different events. ● In groups, learners are guided to discuss and carry out experiments	Why is probability important in real life situations?

		h) appreciate the probability of events occurring in real life situations.	involving mutually inclusive events. ● In groups, learners are guided to discuss and carry out experiments involving independent events. ● In purposive groups, learners are guided to practise representing probability occurrences in a tree diagram. ● In pairs, learners are guided to use digital devices or other resources to explore more on probability.	

Core Competencies to be developed:

- Communication and collaboration: Observing, signing and contributing to group decision making; the learner develops communication skills and teamwork as they discuss and carry out experiments of events involving equally likely outcomes.

- Self-efficacy: The learner looks for opportunities in difficult situations, developing confidence as they carry out experiments involving independent events and avoiding harmful gambling practices.

Values: ● Responsibility: A learner enriches determination as they discuss and carry out experiments involving mutually inclusive events. ● Social justice: A learner enhances co-existence as they work in groups and practice representing probability occurrences in a tree diagram.
Pertinent and Contemporary Issues: ● Socio-Economic and Environmental Issues: Financial literacy: A learner carries out experiments involving independent events and avoids harmful practices of gambling using money.
Link to other learning areas: ● Agriculture and Nutrition: A learner works in groups to explore the weather patterns.
Suggested learning resources ● Coins, dice, data from different sources

Suggested Assessment Rubric

Level / Indicator	Exceeds Expectation	Meets Expectation	Approaches Expectation	Below Expectation
Ability to sign terms related data handling and probability	Signs all terms related data handling and probability including less common terms with precision and correct non manual signals	Signs terms related data handling and probability	Signs terms related data handling and probability but may struggle with some specific categories or miss less obvious terms.	Signs terms related data handling and probability with limitations relying on fingerspelling to sign some terms
Ability to calculate the modal class, the mean and median of a grouped data from real life situations.	Calculates the modal class, the mean and median of a grouped data and exceptionally relates them to real life situations.	Calculates the modal class, the mean and median of a grouped data from real life situations.	Calculates the modal class, the mean and median of a grouped data but partially relates them to real life situations.	Calculates the modal class, the mean and median of a grouped data but struggles to relate them to real life situations.

Ability to determine the range of probability of an event.	Determines the range of probability of an event considering different scenarios and factors.	Determines the range of probability of an event.	Determines the range of probability of an event inadequately.	Determines the range of probability of an event with inconsistencies.

APPENDIX I: COMMUNITY SERVICE LEARNING PROJECT

Introduction

In Grade 9, learners will undertake a CSL activity on thematic areas provided to them. They will be required to identify a community problem through research, design a solution and come up with a plan to solve the problem. The preparations will be carried out in convenient groups. Learners will build on CSL knowledge, skills and attitudes acquired during Life Skills Education as well as other learning areas.

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 innovative ways. Moreover, they could identify business ideas and opportunities as well as resources to meet the needs of the community.

III. **Research:** Learners will develop research skills as they identify a problem or a pertinent issue in the community, design a solution and plan how the problem will be solved. They will then do a report of the project accomplished.

IV. **Communication and collaboration:** Learners will develop these skills as they interrogate the problem in the community, research and brainstorm on a solution, and collaborate with the members of the community in the implementation process.

V. **Citizenship:** Learners will engage in the CSL activities, in appreciation of their responsibilities, rights and privileges as citizens, 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 cohesive, peaceful and inclusive society.

VI. **Life skills:** Learners will develop life skills in decision making, assertiveness, effective communication, and problem solving and stress management.

VII. **Community development:** Learners will be sensitised on the needs or gaps in the community and empowered to take responsibility within their means for stronger and more resilient communities.

Suggested PCIs	**Specific Learning Outcomes**	**Suggested Learning Experiences**	**Suggested key Inquiry Question(s)**
● Environmental degradation ● Lifestyle diseases ● Communicable and non-	By the end of the CSL project, the learner should be able to: a) identify a problem in the community through research	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	1. How does one determine a community need? 2. Why is it necessary to make adequate preparations

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	b) design a solution to the identified problem, c) plan to solve the identified problem in the community, d) implement the plan to solve the problem, e) report and reflect on the concluded project f) appreciate the need to belong to a community.	● 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) ● develop instruments for data collection ● identify resources needed for the CSL project (human, technical, financial)	before embarking on a project?

their context and reality.		• 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) designing solution(s) to the identified problem,
c) planning to implement the solution,
d) implementing the plan to solve the problem,
e) concluding, reflecting, reporting on the project.

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 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 prepare to carry out the project.
- **Citizenship:** This is enhanced as the learner chooses a PCI that needs immediate attention in the community.

Pertinent and Contemporary Issues

- **Social cohesion:** As a learner discusses possible solutions to the identified issue.
- **Critical thinking**: As a learner discusses possible solutions to the identified issue.

Values

- **Integrity:** As a learner carries out research using digital devices and print media as they identify a community problem to address.
- **Respect:** As learner brainstorms on pertinent and contemporary issues in their community that need attention

Suggested Assessment Rubric				
Indicator	**Exceeds Expectation**	**Meets Expectation**	**Approaches Expectation**	**Below Expectation**
Ability to identify a problem in the community	Exhaustively identifies a problem in the community	Identifies a problem in the community	Fairly able to identify a problem in the community with prompts	Has difficulty identifying a problem in the community even with prompts
Ability to design solutions to the identified problem	Elaborately designs solutions to the identified problem	Designs solutions to the identified problem	Fairly able to design solutions to the identified problem with assistance	Has difficulty designing solutions to the identified problem even with assistance
Ability to plan to solve the identified problem	Thoroughly plans to solve the identified problem	Plans to solve the identified problem	Fairly able to plan to solve the identified problem with assistance	Has difficulty planning to solve the identified problem even with assistance

Ability to implement the plan to solve the problem	Comprehensively implements the plan to solve the problem	Implements the plan to solve the problem	Fairly able to implement the plan to solve the problem with assistance	Has difficulty implementing the plan to solve the problem even with assistance
Ability to report on the concluded project	Exhaustively reports on the concluded project	Reports on the concluded project	Partially reports on the concluded project	Has difficulty reporting on the concluded project even with assistance

APPENDIX II: 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. ● Project	Number lines, games on charts, number cards, steps, up and down stairs.	Prepare or improvise number lines games on charts.
	Cubes and cube roots	● Class activities ● Class written tests ● Home or extended assignments or activities.	Multiplication, cubes and cube root tables.	
	Indices and logarithms	● Class activities ● Class written tests	Mathematical tables Calculators.	

Strand	Sub-strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal Activities
		● Home or extended assignments or activities.		
	Compound proportions and rates of work	● Class activities ● Class written tests ● Home or extended assignments or activities.	Digital clocks	
Algebra	Matrices	● Class activities ● Class written tests ● Home or extended assignments or activities.	Information from different sources on arrangement of items in rows and columns.	Carry out activities involving arranging objects from their immediate environment into rows and columns. This can be done at home. Take photos and share with class or school. Use the concept of

Strand	Sub-strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal Activities
				organising objects/items at school and home.
	Equations of a straight line	● Class activities ● Class written tests ● Home or extended assignments or activities.	Rulers, drawing tools, graph papers/ squared books	
	Linear inequalities	● Class activities ● Class written tests ● Home or extended assignments or activities.	Rulers, drawing tools, graph papers/ squared books	
Measurement	Area	● Class written tests	Square cut-outs, squares, writing materials	

Strand	Sub-strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal Activities
		• Home or extended assignments or activities.		
	Volume of solids	• Class written tests • Home or extended assignments or activities • Project	Solids such as prisms, pyramids, cones, spheres	Make models of prisms, pyramids, cones and spheres that can be used as learning resources for Mathematics and other subjects.
	Mass, volume, weight and density	• Class written tests • Home or extended assignments or activities.	Solids such as prisms, pyramids, cones, spheres	

Strand	Sub-strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal Activities
	Time, distance and speed	● Class written tests ● Home or extended assignments or activities ● Project	Clocks, ropes, metre rule, globe, maps, digital devices	Use digital devices or maps and other resources to determine local time of different cities in the world. Use this information to generate possible travel flight schedules.
	Money	● Class activities ● Home or extended assignments or activities ● Project	Currency dummies, paper cut out of foreign currencies	Prepare dummies or paper cut-outs of currencies from different countries and role-play currency exchange activities.
	Approximation and errors	● Class activities ● Home or extended assignments or activities.	Rulers, digital clocks	

Strand	Sub-strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal Activities
Geometry	Coordinates and graphs	● Class activities ● Class written tests ● Home or extended assignments or activities.	Rulers, plotting/graph paper	
	Scale drawing	● Class activities ● Class written tests ● Home or extended assignments or activities ● Project	Pair of compasses, rulers, straight edges	Observe the position of different structures or objects in the school or home compound and sketch. Estimate the distance between the structures or objects and scale-draw the school or home compound.
	Similarity and enlargement	● Class activities ● Class written tests	Similar containers, objects of different sizes	Collect similar containers from the immediate environment including home, discuss how they

Strand	Sub-strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal Activities
		● Home or extended assignments or activities ● Project		are used especially in packaging different quantities. Discuss how packaging can be used to protect consumers.
	Trigonometry	● Class activities ● Class written tests	Pair of compasses, rulers, straight edges	
Data handling and probability	Data interpretation (Grouped data)	● Class activities ● Class written tests	Data from different sources	
	Probability	● Class activities ● Class written tests	Coins, dice, data from different sources	

APPENDIX III: 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. CDs
12. Scanners
13. Internet
14. Other resources.