REPUBLIC OF KENYA

MINISTRY OF EDUCATION

JUNIOR SCHOOL CURRICULUM DESIGN

MATHEMATICS

GRADE 8

FOR LEARNERS WITH VISUAL IMPAIRMENT

KENYA INSTITUTE OF CURRICULUM DEVELOPMENT

A Skilled and Ethical Society

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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 eight curriculum designs for learners with visual impairment build on competencies attained by learners at Grade 7. 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.

HON. EZEKIEL OMBAKI MACHOGU, CBS
CABINET SECRETARY,
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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 eight curriculum furthers implementation of the CBC from Grade seven. 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 eight curriculum designs for learners with visual 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 eight and prepare them for smooth transition to Grade nine. 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 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 eight curriculum designs for learners with visual 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 eight curriculum designs for learners with visual 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 eight and preparation of learners with visual impairment for transition to Grade nine.

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NATIONAL GOALS OF EDUCATION

Education in Kenya should:

i) Foster nationalism and patriotism and promote national unity.

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

ii) Promote the social, economic, technological and industrial needs for national development.

Education should prepare the youth of the country to play an effective and productive role in the life of the nation.

a) **Social Needs**

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

b) **Economic Needs**

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

c) **Technological and Industrial Needs**

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

iii) Promote individual development and self-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.

LESSON ALLOCATION AT JUNIOR SCHOOL

S/No	Learning Area	Number of Lessons Per Week
1.	English for learners with visual impairment	5
2.	Kiswahili for learners with visual impairment	4
3.	Mathematics for learners with visual impairment	5
4.	Religious Education	4
5.	Social Studies for learners with visual impairment	4
6.	Integrated Science for learners with visual impairment	5
7.	Pre-Technical Studies for learners with visual impairment	4
8.	Agriculture and Nutrition for learners with visual impairment	4
9.	Creative Arts and Sports for learners with visual impairment	5
	Pastoral /Religious Instructional Program	1
Total		**41**

NOTE: Braille skills for learners with blindness be implemented as Non-formal (co-curricular) programmes

LEARNING OUTCOMES FOR MIDDLE SCHOOL

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

1. Apply literacy, numeracy and logical thinking skills for appropriate self-expression.
2. Communicate effectively, verbally and non-verbally, in diverse contexts.
3. Demonstrate social skills, spiritual and moral values for peaceful co-existence.
4. Explore, manipulate, manage and conserve the environment effectively for learning and sustainable development.
5. Practice 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

Mathematics is essential to our daily interactions whereby we count, add, subtract, multiply or divide quantities and substances. It involves understanding numbers and the numerical operations used to develop strategies for mental mathematical problem-solving skills, estimation and computational fluency. It covers areas like space, shape and structures, therefore learners with visual impairment will be guided to use adapted learning experiences and resources to take part in activities involving abstract concepts. It is impossible to think of a world without Mathematics which can be applied in the economic activities, scientific, social, religious and political worlds. It is therefore imperative that learners with visual impairment learn Mathematics from early years.

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

SUBJECT GENERAL LEARNING OUTCOMES

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

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

SUMMARY OF STRANDS AND SUB STRANDS

STRANDS	SUB STRANDS	Suggested Number of Lessons
1.0 Numbers	1.1 Integers	6
	1.2 Fractions	6
	1.3 Decimals	8
	1.4 Squares and Square Roots	6
	1.5 Rates, Ratio, Proportions and Percentages	14
2.0 Algebra	2.1 Algebraic Expressions	6
	2.2 Linear Equations	7
3.0 Measurements	3.1 Circles	5
	3.2 L Area	10
	3.3 Money	9
4.0 Geometry	4.1 Geometrical Constructions	12
	4.2 Coordinates and graphs	14
	4.3 Scale Drawing	14
	4.4 Common Solids	16
5.0 Data Handling and Probability	5.1 Data Presentation and Interpretation	10
	5.2 Probability	7
Total Number of Lessons		**150**
Note: The suggested number of lessons per sub strand may be less or more depending on the context.		

STRAND 1.0: NUMBERS

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 NUMBERS	**1.1 Integers** (6 lessons)	By the end of the sub- strand the learner should be able to: a) identify integers in different situations, b) represent integers on a number line in different situations, c) interpret tactile number lines in different situations *(for learners with blindness)*, d) carry out operations of addition and subtraction of integers on the number line in real life situations, e) use IT tools or other resources for learning more on decimals and for enjoyment, f) reflect on use of integers in real-life situations.	● In groups, learners carry out activities involving positive and negative numbers and zero. For example, climbing stairs (positive), going down stairs (negative). Others may include standing at a point (the zero point) and count the number of steps moved either forward or backward. ● Learners with low vision draw and represent integers on number lines on learning materials. Learners with blindness are guided to manipulate a tactile number line and interpret the integers on it. ● Learners are guided to perform operations, including combined operations of integers on a number line. Learners with blindness to be guided individually to align their work precisely on the braille paper to avoid making of errors in the final answer. ● In groups, learners play creative games that involve number lines, for example jumping steps. Learners with blindness to be paired by sighted peers during playing of creative games. ● Learners are guided to use digital devices with assistive technology or other resources to learn more on operations of integers on number lines.	1. Why do we use integers in real life situations? 2. How do we carry out operations of integers?

Core Competencies to be developed:

- Creativity and imagination: The learner develops originality skills as they play creative games that involve number lines, for example jumping steps.
- Learning to learn: The learner develops exploration skills as they represent integers on the number line.
- Digital literacy: The learner develops interaction with technology as they use digital devices with assistive technology to learn and play games on integers.

Values:

- Respect: The learner enhances etiquette as they work in groups to play games that involve integers.

● Unity: The learner enriches cooperation as they work together in creating games on integers.
Pertinent and Contemporary Issues (PCIs): ● Environmental education: The learner appreciates the gift of nature as they use available resources and spaces to jump steps.
Links to other subjects: ● Integrated Science: The learner works out operations that involve integers.
Suggested Learning Resources: ● Digital devices with assistive technology such as screen magnifiers, tactile number line and Print and Braille Course book.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 NUMBERS	**1.2 Fractions** (6 lessons)	By the end of the sub- strand, the learner should be able to: a) carry out combined operations on fractions in different situations, b) work out operations on fractions in real life situations, c) use IT tools or other resources for learning more on decimals and for enjoyment, d) promote use of fractions in real life situations.	● In groups, learners discuss and use the correct order of operations in fractions. Learners with blindness be guided on how to interpret different types of brackets used in combined operations in fractions and how to represent fractions using absolute stroke. ● In groups, learners discuss and carry out operations on fractions from activities such as shopping and other real-life cases. ● Learners play games of operations on fractions using digital devices with assistive technology or other resources.	1. How do we carry out combined operations on fractions in different situations? 2. How do we use fractions in real-life situations?
Core Competencies to be developed: ● Citizenship: The learner develops responsible decision making as they discuss and use the correct order of operations in fractions in some aspects such as populations. ● Critical thinking and problem solving: The learner articulates a problem as they work out operations on fractions from shopping activities.				
Values: ● Responsibility: The learner develops diligence as they play games of operations on fractions using digital devices with assistive technology or other resources. ● Respect: The learner enhances etiquette as they work together to work out operations on fractions from shopping activities.				

Pertinent and Contemporary Issues (PCIs):

- Life skills and values -Self-esteem: The learner develops confidentiality as they play games of operations on fractions using digital devices or other resources.

Links to other subjects:

- Languages: The learner discusses and uses the correct order of operations in fractions.
- Agriculture and Nutrition: The learner estimates harvests, seeds or fertiliser required for sowing or application in fractions.

Suggested Learning Resources:

- Digital devices with assistive technology such as screen magnifiers and screen readers, Print and Braille Course Book.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 NUMBERS	**1.3 Decimals** (8 lessons)	By the end of the Sub Strand, the learner should be able to: a) describe how decimals relate to fractions in a variety of contexts, b) convert fractions to decimals in different situations, c) write the symbol for recurring decimal in braille, *(for learners with blindness)* d) identify recurring decimals in different situations, e) convert recurring decimals into fractions in different situations, f) round off a decimal number to a required number of decimal places in different situations, g) express numbers to a required significant figure in real-life situations, h) express numbers in standard form in different situations, i) carry out combined operations on decimals in different situations,	● Learners brainstorm on prior knowledge on decimals and how they relate with fractions and share with peers in class. ● In groups, learners practice converting fractions to decimals. ● Learners with blindness are guided to identify the symbol for recurring decimal on braille work cards and practice writing recurring decimals. ● In groups, learners are guided to discuss and classify non- recurring and recurring decimals. Indicate the recurring digits. Learners to practise converting recurring decimals to fractions. ● In groups, learners discuss and round off decimal numbers to a required number of decimal places. Learners with blindness to be guided on how to identify and write the symbol for decimal in braille in decimal numbers. ● Learners are guided to write decimal and whole numbers to a given significant figures.	1. How do we work out operations on decimals? 2. How do we use decimals in real-life situations?

		j) apply decimals to real-life situations, k) use IT tools or other resources for learning more on decimals and for enjoyment, l) promote use of decimals in real-life situations.	● Learners with low vision are guided to write numbers in standard form. Learners with blindness are guided to denote numbers in standard form in braille. ● Learners work out combined operations on decimals in the correct order. ● In groups, learners discuss and apply decimals to real-life cases. ● Learners play games of operations on decimals using digital devices with assistive technology or other materials.	

Core Competencies to be developed:

- Citizenship: The learner demonstrates interest as they interact with others as they work in groups, discussing and classifying non-recurring and recurring decimals.
- Critical thinking and problem solving: The learner demonstrates to follow simple instructions to complete tasks as they practice converting recurring decimals to fractions.

Values:

- Responsibility: The learner enriches determination as they discuss and classify non-recurring and recurring decimals.
- Respect: The learner enhances etiquette on working as they groups to discuss and classify non-recurring and recurring decimals.

Pertinent and Contemporary Issues (PCIs):

- Self-esteem: The learner enhances resilience as they work out combined operations on decimals in the correct order.

Links to other subjects:

- Languages: The learner discusses and applies decimals to real-life cases.
- Integrated Science: The learner expresses different quantities of measurement in Science in decimals.

Suggested Learning Resources:

- Braille charts, Braille cards and digital devices with assistive technology such as screen readers, adapted keyboards, magnifiers and Print and Braille Course Book.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 **NUMBERS**	**1.4 Squares and Square roots (6 lessons)**	By the end of the Sub Strand the learner should be able to: a) State the squares and square root of common numbers in different situations, b) work out the squares of numbers from tables in different situations, c) work out the square roots of numbers from tables in different situations, d) work out squares and square roots of numbers using a calculator in different situations, e) use IT tools or other resources for learning more on decimals and for enjoyment, f) enjoy using squares and square roots in real-life situations.	● Learners identify the squares and square root of common numbers that form simple squares and square roots in a variety of real life situations. ● Learners with low vision are guided to read and write the squares of numbers from tables. ● Learners with blindness are guided to manipulate and note the layout of braille mathematics tables, then be guided on how to match values in rows and columns. ● Learners read and write the square roots of numbers from tables. ● Learners practise working out squares and square roots using a scientific or talking calculator ● Learners use digital devices with assistive technology or other materials to play square and square root games. ● Learners create games that involve squares and square roots of numbers.	1. How are squares and square roots of numbers used in real life situations? 2. Why do we apply squares and square roots in real life situations?
Core Competencies to be developed: ● Communication and collaboration: The learner speak clearly and effectively using appropriate language, expression and gestures as they work in groups to read and write the square roots of numbers from tables ● Imagination and creativity: The learner develop open-mindedness and creativity as they read and write the square roots of numbers from tables				
Values: ● Respect: The learner appreciates each other's contribution in creating games that involve squares and square roots of numbers. ● Unity: The learner enriches cooperation as they work in teams to play games involving squares and square roots of numbers.				

Pertinent and Contemporary Issues (PCIs):

- Life skills: The learner acquires life skills as they use digital devices or other materials to play games on squares and square root games.
- Environmental education: The learner appreciates the gift of nature as they use digital devices or other materials to play square and square root games.

Links to other subjects:

- Pre-Technical Studies: The learner applies knowledge of squares and square roots in designing items to make.

Suggested Learning Resources:

- Braille Elementary Mathematical tables, Scientific talking calculators and digital devices with assistive technology such as screen magnifiers, readers, adapted keyboards and Print and Braille Course Book.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 **NUMBERS**	1.5 **Rates, Ratio, Proportions and Percentages** (14 lessons)	By the end of the Sub Strand the learner should be able to: a) identify rates in different situations, b) work out rates in real-life situations, c) express fractions as ratios in real-life situations, d) compare two or more ratios in different situations, e) divide quantities in given ratios in real-life situations, f) work out ratios in different situations, g) work out increase and decrease of quantities using ratios in real-life situations, h) work out percentage change of given quantities in real-life situations, i) identify direct and indirect proportions in real-life situations, j) work out direct and indirect proportions in real-life situations, k) promote use of ratios and proportions in real life.	● In groups, learners time while doing different activities such as calling using for example different mobile service providers. ● Learners role play this activity and note time taken to call, record on a table and compare. Learners with blindness are given one on one orientation on the role to play in the activity. ● Learners use cut-outs from whole objects or substances to relate fractions to ratios. Learners with blindness are guided to manipulate the cut-outs before undertaking the activity. ● Learners discuss and compare ratios from the cut-outs. ● Learners discuss and share quantities of concrete objects in different ratios. ● Learners discuss and determine percentage increase and decrease of different quantities. ● Learners use digital devices with assistive technology or other materials to explore percentage change.	1. How do we use rates in real life situations? 2. How do we use ratios in daily activities?

			● In groups learners role play shopping activities to show and determine direct relationships and can use any other activities. ● Learners use hourglass to show and determine indirect relationships and can use any other activities. Learners with blindness are given verbal descriptions on the aspects that require sight when using the hourglass. ● Learners watch/ listen to videos on ratios and proportions as used in daily activities.	

Core Competencies to be developed:

- Critical thinking and problem solving: The learner examines links between these problems and other problems as they carry out different activities such as calling using different service providers as they determine calling rates.
- Imagination and creativity: The learner undertakes tasks that they see as they use hourglass to show indirect relationships.

Values:

- Respect: The learner enhances etiquette as they share different quantities in given ratios.
- Integrity**:** The learner enhances discipline by sharing out quantities in different proportions or percentages.

Pertinent and Contemporary Issues (PCIs):

- Social cohesion: The learner role plays time taken to call at a specified time and also charges from different telecom service providers.
- Decision making: The learner develops creativity as they use ratios to divide quantities such as money on different items to buy as part of consumer awareness.

Links to other subjects:

- Agriculture and Nutrition: The learner works out ratios of ingredients in various aspects of home care e.g., baking.
- Pre-Technical Studies: The learner works out ratios or proportions of different building materials and calculates rates of calling from service providers as part of consumer protection.

Suggested Learning Resources:

- Cut outs, digital devices with assistive technology such as adapted keyboards, screen readers and magnifiers Mobile phones, Hour glass and Print and Braille Course Book.

Suggested Assessment Rubric

Level / Indicator	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to • carry out operations of addition and subtraction of integers on the number line in real life situations, • carry out combined operations on fractions in different situations, • convert recurring decimals into fractions in different situations, • work out the square roots of numbers from tables in different situations, • work out squares and square roots of numbers using a calculator in different situations, • work out ratios in different situations,	The learner demonstrates the six skills.	The learner demonstrates four to five skills.	The learner demonstrates two to three skills.	The learner demonstrates one or no skill.

STRAND 2.0: ALGEBRA

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 ALGEBRA	**2.1 Algebraic Expressions** (6 Lessons)	By the end of the Sub Strand the learner should be able to: a) explain the concept of factorisation in relation to expressions in different situations, b) factorise algebraic expressions in different situations, c) simplify algebraic fractions in different situations, d) evaluate algebraic expressions by substituting numerical values in different situations, e) enjoy using algebraic expressions in real-life situations.	● In groups, learners discuss factorisation in a variety of contexts and identify like and unlike terms and factorise algebraic expressions. Learners with blindness are guided to identify; different types of brackets, algebra from numbers. Learners with blindness are guided to arrange their work precisely to avoid mismatch errors in the final answer, ● Learners are guided to simplify the algebraic fractions. Learners with blindness are guided to express algebraic fractions using absolute stroke. ● Learners discuss how to substitute the given numerical values to work out a given algebraic expression. ● Learners to use digital devices with assistive technology to research more on algebraic activities. ● Learners use other resources to work out algebra exercises.	1. How do we factorise algebraic expressions? 2. How do we simplify algebraic expressions?

Core Competencies to be developed:

- Critical thinking and problem solving: The learner studies the instructions before getting started to discuss like and unlike terms to factorise and simplify algebra.
- Self-efficacy: The learner acquires negotiation skills as they use varied resources to work out algebra.

Values:

- Responsibility: The learner enriches determination as they discuss and substitute values in algebraic expressions.

Pertinent and Contemporary Issues (PCIs):

- Environmental education: The learner appreciates the gift of nature as they use varied resources for like and unlike terms in algebra.

Links to other subjects:

- Integrated Science: The learner uses symbols to represent quantities for substances.

Suggested Learning Resources:

- Digital devices with assistive technology such as screen readers, magnifiers, adapted keyboards, Print and Braille Course Books.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 **ALGEBRA**	2.2 **Linear Equations** **(7 Lessons)**	By the end of the sub strand the learner should be able to: a) identify simultaneous equations in mathematical problems, b) form linear equations in two unknowns in real-life situations, c) solve linear equations in two unknowns by substitution method in real life situations, d) solve linear equations in two unknowns by elimination method in real-life situations, e) apply linear equations in two unknowns in real-life situations, f) recognise the use of linear equations in real life.	● In groups, learners are guided to role play activities such as shopping on two different items in the shop and relate the activity to simultaneous equations in real lime mathematical contexts. ● Learners discuss and use substitution methods to find the solutions of simultaneous equations in two unknowns. Learners with blindness are guided on proper alignment of linear equations in braille before finding the solution. ● Learners discuss and use substitution methods to find the solutions of simultaneous equations in two unknowns. ● Learners discuss and use elimination methods to find the solutions of simultaneous equations in two unknowns. ● Learners practise forming and solving simultaneous equations in two unknowns in real-life cases using any method. ● Learners are guided to watch/ listen to videos or use other materials involving linear equations in two unknowns.	1. How do we solve linear equations in two unknowns? 2. Why do we use linear equations in two unknowns in real life situations?

Core Competencies to be developed:

- Communication and collaboration: The learner develops speaking skills as they discuss and use substitution methods to find the solutions of simultaneous equations in two unknowns.

● Digital literacy: The learner uses new digital technology as they accomplish their own task by watching videos or using other materials involving linear equations in two unknowns.
Values: ● Responsibility: The learner enhances diligence as they practise forming and solving simultaneous equations in two unknowns of real-life cases
Pertinent and Contemporary Issues (PCIs): ● Citizenship: The learner develops active social skills as they role play shopping activities on two different items in the shop to form linear equations in two unknowns.
Links to other subjects: ● English: The l**e**arner discusses with others and uses substitution methods to find the solutions of simultaneous equations.
Suggested Learning Resources: ● Digital devices with assistive technology such as screen magnifiers, Print and Braille Course Books.

Suggested Assessment Rubric

Level / **Indicator**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to: • simplify algebraic fractions in different situations, • evaluate algebraic expressions by substituting numerical values in different situations, • solve linear equations in two unknowns by substitution method in real life situations, • solve linear equations in two unknowns by elimination method in real-life situations,	The learner demonstrates the four skills	The learner demonstrates three skills	The learner demonstrates two skills	The learner demonstrates one or no skill

STRAND 3.0: MEASUREMENTS				
Strand	**Sub Strand**	**Specific Learning Outcomes**	**Suggested Learning Experiences**	**Suggested Key Inquiry Question(s)**
3.0 MEASUREMENTS	**3.1 Circles** (5 lessons)	By the end of the Sub Strand the learner should be able to: a) define circumference of a circle in different situations, b) work out the circumference of a circle in real-life situations, c) work out the length of an arc of a circle in different situations, d) calculate the perimeter of a sector of a circle in different situations, e) promote use of circles in real-life situations.	● In groups or in pairs, Learners use models or real objects to demonstrate their understanding of the circumference of a circle ● In groups, learners discuss and find the circumference of different circular objects in the environment. Learners with blindness are guided identify pi in braille and practise using when finding circumference of a circle. ● Learners are guided to use cut-outs to relate arc length to the circumference of a circle, starting with a semicircle, then quarter of a circle. ● Learners with low vision are guided to draw circles and work out the circumference of a circle, and arc length of a circle. Learners with blindness are guided to manipulate circles, semicircles and quarters of a circle and calculate the circumference and length of arcs. ● In groups, learners use cut-outs of sectors of circles from locally available materials and work out the perimeter of the sectors. Discuss and make any object with the	1. How do we determine the circumference of a circle? 2. How do we use sectors of a circle in real-life situations?

			sector that can be used in real-life situations. ● Learners use digital devices with assistive technology or other resources to explore the use of sectors of circles in daily life.	

Core Competencies to be developed:

- Communication and collaboration: The learner contributes to group decision making as they recognise the value of others' ideas during discussion to find the circumference of different circular objects in the environment.
- Creativity and imagination: The learner enhances originality skills as they use cut outs to relate arc length to the circumference of a circle.

Values:

- Integrity: The learner enhances discipline as they draw circles of given dimensions and work out the circumference of a circle.
- Responsibility**:** The Learner enriches determination as they make any objects with the sector that can be used in real-life situations.

Pertinent and Contemporary Issues (PCIs):

- Environmental education: The learner appreciates the gift of nature as they use locally available materials to cut out sectors responsibly.

Links to other subjects:

- English: The learner discusses with others and finds the circumference of different circular objects in the environment.

Suggested Learning Resources:

- Cut-outs, tactile circles, digital devices with assistive technology such as screen magnifiers, screen readers, Print and Braille Course Books.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
3.0 MEASUREMENTS	**3.2 Area** **(10 lessons)**	By the end of the Sub Strand the learner should be able to: a) write formulae for calculating area of regular shapes in braille *(for learners with blindness)*, b) calculate the area of circles in different situations, c) work out the area of a sector of a circle in different situations, d) work out the surface area of cubes and cuboids in real-life situations, e) work out the surface area of a cylinder in real-life situations, f) determine the surface area of a triangular prism in different situations, g) work out the area of irregular shapes using square grids in real-life situations, h) use IT tools and other materials for learning more on are and for enjoyment, i) appreciate use of length in real-life situations.	● In pairs, learners with blindness are guided to identify and write the formulas for calculating surface area of regular shapes from braille cards. (Formulas for area of; circle, sector of a circle, cubes, cuboids, cylinder and triangular based prism). ● In groups, learners discuss and work out areas of different circles. ● In groups, learners use cut-outs of sectors of circles from locally available materials and find the area. ● In groups, learners use models to find the surface area of cubes, cuboids and cylinders and derive the formulas for each. ● Learners apply the formulas to work out surface area of given cubes, cuboids and cylinders. ● Learners use models to find the surface area of triangular prisms. ● In groups, learners with low vision are guided to draw irregular shapes, for example their palm of hands, feet, leaves etc. and trace on a square grid to estimate the area. ● Learner with blindness are guided to manipulate tactile diagrams of irregular shapes on square grids and estimates their areas.	1. How do we use area in real-life situations? 2. How do we work out the surface area of a triangular prism in different situations?

			● Learners are guided to watch or listen to videos on models of cubes, cuboid, cylinders and prisms and how to find the surface area. ● In pairs, learners are guided to make or improvise models or containers from locally available materials with appropriate font and colour contrast or texture and find their areas.	

Core Competencies to be developed:

- Critical thinking and problem solving: The learner develops open mindedness and creativity as they use cut-outs of sectors of circles from locally available materials and find the area.
- Learning to learn: The learner works collaboratively as they use models to find the surface area of cubes, cuboids and cylinders and derive the formulas for each.

Values:

- Responsibility: The learner enhances diligence and excellence as they use models to find the surface area of triangular prisms.

Pertinent and Contemporary Issues (PCIs):

- Safety and security: The learner practices caution as they handle different instruments as they make cut-outs of sectors from locally available materials.
- Environmental education: The learner appreciates the gift of nature as they use locally available materials to draw irregular shapes, for example their palm of hands, feet and leaves

Links to other subjects:

- Creative Arts and Sports: The learner draws irregular shapes, for example their palm of hands, feet, leaves.

Suggested Learning Resources:

- Cut-outs , digital devices with assistive technology such as screen magnifiers, screen readers, adapted keyboards, Print and Braille Course Book.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
3.0 MEASUREMENTS	**3.3 Money** (9 lessons)	By the end of the Sub Strand, the learner should be able to: a) identify interest and principal in real-life situations, b) calculate simple interest in real-life situations, c) calculate compound interest per annum step by step up to three years in real-life situations, d) work out appreciation and depreciation per annum step by step up to three years in different situations, e) work out hire purchase in real-life situations, f) spend money responsibly on needs and leisure.	● Learners are guided to visit or invite resource persons from different financial institutions in the neighbourhood of the school or home and gather information about simple and compound interests offered on deposits (principal). ● Learners enquire and discuss terms of interests on deposits (principal) as part of consumer awareness and protection. ● In groups, learners discuss and work out compound interests. Learners are guided to interpret and use compound interest formulas in print and braille. ● In groups, learners identify and discuss objects or goods that appreciate and depreciate in value to inform decision making on goods that are worth investing in or buying. ● Learners determine appreciation and depreciation using a step by step method. ● Learners visit places where items are offered on hire purchase and discuss different terms of purchase. This can be done either as physical or online searches. They can relate different pricing of the goods. They should discuss the instalments periods and time to inform purchasing decisions that will protect from products that highly lose value with time.	1. Why is interest charged on money? 2. How do we pay for goods on hire purchase?

			● Learners use digital devices with assistive technology to access online shopping platforms and identify terms of sale.	

Core Competencies to be developed:

- Communication and collaboration: The learner contributes to group decision making as they gather information about simple and compound interests offered on deposits (principal).
- Critical thinking and problem solving: The learner demonstrates that they can follow simple instructions to complete tasks as they discuss appreciation and depreciation using step by step methods and discuss what goods are worth investing in or buying.
- Digital literacy: The learner searches online shopping platforms or other sources for different types of goods for consumer awareness.

Values:

- Responsibility: The learner enhances determination as they make responsible choices on shopping goods that they appreciate.

Pertinent and Contemporary Issues (PCIs):

- Citizenship: The learner enhances love for the country as they use money (Kenya shillings) to buy goods.

Links to other subjects:

- English: The learner identifies and discusses objects and goods that appreciate and depreciate in value.

Suggested Learning Resources:

- Digital devices with assistive technology such as screen magnifiers, screen readers, Resource person and Print and Braille course book.

Suggested Assessment Rubric

Level / Indicator	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations

Ability to: • calculate the perimeter of a sector of a circle in different situations, • work out the area of a sector of a circle in different situations, • work out the area of irregular shapes using square grids in real-life situations, • work out appreciation and depreciation per annum step by step up to three years in different situations,	The learner demonstrates the four skills.	The learner demonstrates the three skills.	The learner demonstrates two skills.	The learner demonstrates one or no skill

STRAND 4.0: GEOMETRY				
Strand	**Sub-Strand**	**Specific Learning Outcomes**	**Suggested Learning Experiences**	**Suggested Key Inquiry Question(s)**
4.0 GEOMETRY	**4.1.1 Geometrical Constructions *(for learners with low vision)*** (12 lessons)	By the end of the sub- strand, the learner should be able to: a) construct parallel and perpendicular lines in different situations, b) divide a line proportionally in different situations, c) identify angle properties of polygons in different situations, d) construct regular polygons up to a hexagon in different situations, e) construct irregular polygons up to a hexagon in different situations,	• In groups, learners are guided to identify and practice constructing parallel and perpendicular lines. • Learners are guided to divide a line proportionally using different methods. • Learners discuss angle properties of polygons and relate the number of right angles to the number of sides and determine the angles in a given polygon. • In groups, learners construct regular polygons using measuring equipment. • Learners construct irregular polygons using measuring equipment. • Learners practice constructing circles passing through vertices of given triangles. • Learners practice constructing circles touching sides of given triangles.	1. How do we construct polygons? 2. Why do we use polygons in real life situations?

		f) construct circles passing through the vertices of a triangle in different situations, g) construct circles touching the sides of the triangle in different situations, h) appreciate geometric patterns in objects and substances in real life.	• Learners watch audio-visual clips on how to construct polygons using different construction software. • Learners use digital devices with assistive technology or other devices to create patterns using circles touching sides or vertices of triangles or polygons.	

Core Competencies to be developed:

- Digital literacy**:** The learner interacts with technology as they use digital devices with assistive technology or other devices to create patterns using circles touching sides or vertices of triangles or polygons.
- Communication and collaboration: The learner develops teamwork as they discuss in groups angle properties of polygons and relate the number of right angles to the number of sides.

Values:

- Love: The learner shares the available construction equipment when constructing parallel and perpendicular lines.
- Respect: The learner enhances etiquette as they listen keenly and appreciate each other's opinion when discussing angle properties of polygons and relating the number of right angles to the number of sides.

Pertinent and Contemporary Issues:

- Environmental issues in Education: The learner appreciates the gift of nature as they use materials or resources within the environment to create patterns and dispose off waste appropriately.

Links to other subjects:

- Pre-technical Studies: The learner constructs regular polygons using a pair of compasses, rulers and protractors.
- Creative arts and sports: The learner applies construction skills to make different shapes.

Suggested learning resources:

- Geometrical construction apparatus calibrated in appropriate font and colour contrast, digital devices with assistive technology such as screen magnifiers, screen readers and tactile keyboards.

Strand	Sub-strand	Suggested learning outcomes	Suggested learning experiences	Suggested Key Inquiry Question(s)
4.0 GEOMETRY	**4.1.2 Geometrical drawings** ***(for learners with blindness)*** (12 lessons)	By the end of the sub- strand the learner should be able to: a) draw parallel and perpendicular lines in different situations, b) divide a line proportionally in different situations, c) identify angle properties of polygons in different situations, d) interpret angles and lengths of regular polygons up to a hexagon in different situations, e) interpret angles and lengths of irregular polygons up to a hexagon in different situations, f) interpret the angles and sides of the circumscribed circle on embossed diagrams, g) interpret the angles and sides of the inscribed circle on embossed diagrams, h) appreciate geometric patterns in objects and substances in real life.	• Learners are guided to manipulate tactile parallel and perpendicular lines for familiarisation. • In groups, learners are guided to draw parallel and perpendicular lines using tactile measuring equipment. • In groups, learners are guided to divide a line proportionally using tactile measuring equipment. • In groups, learners discuss angle properties of tactile polygons, relate the number of right angles to the number of sides and determine the sizes of angles. • In groups, learners tactually manipulate cut outs of polygons and embossed diagrams of polygons measure angles and lengths of regular polygons. • In pairs, learners tactually manipulate cut outs of polygons and embossed diagrams of irregular polygons to measure angles and lengths. • In groups, learners manipulate embossed circles passing through vertices of given triangles and measure the angles and sides of a triangle inside the circle. • In groups, learners manipulate embossed circles touching sides of given triangles and measure the angles and sides of the triangle. • In groups, learners listen to audio clips on how to construct polygons using different construction software. • Learners use digital devices with assistive technology or other tactile resources to create tactile patterns using circles touching sides of triangles or polygons.	Why do we use polygons in real life situations?
Core Competencies to be developed:				

- Communication and collaboration: The learner develops teamwork as they discuss in groups angle properties of polygons and relate the number of right angles to the number of sides.
- Digital literacy**:** The learner interacts with technology as they use digital devices with assistive technology or other devices to create patterns using circles touching sides or vertices of triangles or polygons.

Values:

- Responsibility: The learner enhances diligence as they use and store resources safely.
- Respect: The learner enhances etiquette as they listen keenly and appreciate each other's opinion when discussing angle properties of polygons and relating the number of right angles to the number of sides.

Pertinent and Contemporary Issues:

- Environmental issues in Education: The learner appreciates the gift of nature as they use materials or resources within the environment to create patterns and dispose off waste appropriately.

Links to other subjects:

- Pre-technical Studies: The learner constructs regular polygons using a pair of compasses, rulers and protractors.
- Creative arts and sports: The learner applies construction skills to make different shapes.

Suggested learning resources:

- Adapted Rulers, tactile protractors, Protractors with appropriate font and colour contrast, tactile set squares, set squares with appropriate calibrations, Steady pairs of compasses, digital devices with assistive technology such as screen magnifiers and screen readers.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
4.0 GEOMETRY	**4.2 Coordinates and graphs** (14 lessons)	By the end of the Sub Strand, the learner should be able to: a) draw a labelled Cartesian plane on different learning materials, *(for learners with low vision),* b) interpret a tactile Cartesian plane, *(for learners with blindness)* c) identify points on the Cartesian plane in different situations, d) plot points on the Cartesian plane in different situations, e) generate table of values for a linear equation in different situations, f) determine an appropriate scale for a linear equation on the Cartesian plane in different situations, g) draw a linear graph from table of values on Cartesian plane in different situations, h) solve simultaneous linear equations graphically in different situations, i) apply simultaneous equations in real-life situations, j) use IT or other resources to learn more on coordinates and graphs, k) reflect on the use of graphs in real life.	● Learners with low vision draw and appropriately label the axes on the Cartesian plane. Learners with blindness are guided to manipulate a tactile Cartesian plane and identify its axes. ● Learners with low vision practise locating and plotting points on the Cartesian plane appropriately. Learners with blindness are guided to manipulate and match the x and y-axes to locate points on the tactile Cartesian plane. ● In groups, learners discuss and read coordinates of points on the Cartesian plane. They write the coordinates in terms of (horizontal value, vertical value) ● In groups, learners discuss, choose and use appropriate scale for a given data. ● Learners with low vision discuss and make an appropriate table of values for a given linear equation and draw the linear graphs. Learners with blindness are guided to manipulate and interpret tactile linear graphs. ● Learners with low vision generate the values in a table of the simultaneous linear equations and draw the graphs, reading the point of intersection as a solution for the equations. Learners with blindness manipulate and interpret tactile graphs to generate values the simultaneous linear equations	1. How do we plot coordinates on the Cartesian plane? 2. Why do we use linear graphs in real life?

			● In groups, learners discuss and form simultaneous equations from statements and solve using graphs. ● Learners use digital devices with assistive technology for graphing tools to create linear graphs or use other materials to practise drawing linear graphs.	

Core Competencies to be developed

- Communication and collaboration: The learner listens critically, discusses as they read coordinates of points on the Cartesian plane.
- Critical thinking and problem solving: The learner creates different options in life as they generate the values in a table of the simultaneous linear equations.
- Digital literacy**:** The learner selects digital devices, applications, software and systems as they create linear graphs.

Values

- Respect : The learner enhances etiquette by discussing and making an appropriate table of values for a given linear equation and draw the linear graphs

Pertinent and Contemporary Issues (PCIs)

- Citizenship: The learner promotes equity by practising locating and plotting points on the Cartesian plane appropriately.

Links to other subjects

- Integrated Science: The learner draws the graphs of different content areas.

Suggested Learning Resources

- Digital devices with assistive technology such as screen readers and magnifiers., tactile graphs and Print and Braille Course Books.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
4.0 GEOMETRY	**4.3 Scale Drawing** **(**14 lessons**)**	By the end of the Sub Strand, the learner should be able to: a) represent length to a given scale in different situations, b) convert actual length to scale length in real-life situations, c) convert scale length to actual length in real-life situations, d) interpret linear scales in statement form in different situations, e) write linear scales in statement form in different situations, f) interpret linear scales in ratio form in different situations, g) write linear scales in ratio form in different situations, h) convert linear scale from statement form to ratio form and ratio form to statement form in different situations, i) make scale drawings in different situations, j) apply scale drawing in real-life situations, k) appreciate the use of scale drawing in maps.	● Learners with low vision measure length using rulers with appropriate font and colour contrast and represent length of different objects from the immediate environment. Learners with blindness are given one on one demonstration and verbal description on measuring length of different objects in the immediate environment using a tactile ruler and represent length of different objects from the immediate environment. ● In groups, learners discuss and practise converting scale from one form to another. ● Learners read, discuss and interpret given linear scales in statement form. ● Learners discuss and write given linear scales in statement form. ● Learners read, discuss and interpret given linear scales in ratio form. ● In groups, learners discuss and carry out conversions of scales from one form to another. ● In pairs, learners with low vision make scale drawings on different appropriate learning materials using appropriate scale while learners with blindness make tactile regular shapes using scale drawings on different appropriate	1. How do we determine scales in real life? 2. Why do we use scale drawing in real-life situations?

			learning materials using appropriate scale. ● Learners use digital devices with assistive technology to display the maps and use the zoom functions to demonstrate scale. ● Learners with low vision use maps in appropriate font and colour contrast to demonstrate scale while learners with blindness use tactile maps to undertake the activity.	

Core Competencies to be developed:

- Communication and collaboration: The learner contributes to group decision making as they discuss and practise converting scale from one form to another.
- Critical thinking and problem solving: The learner develops strategic plans as they discuss and write given linear scales in statement form.
- Digital literacy: The learner demonstrates having knowledge of being updated with the evolution of digital devices, application software and service as they use digital devices to display the maps and use the zoom functions to demonstrate scale.

Values:

- Responsibility: The learner enriches determination as they read, discuss and interpret given linear scales in ratio form.
- Citizenship: The learner promotes equity as they measure and represent the length of different objects from the immediate environment in their work books.

PCIs

- Environmental education: The learner appreciates the gift of nature as they measure and represent the length of different objects from the immediate environment in their work books.

Links to other subjects:

- Pre-Technical Studies: The learner reads and makes scale drawings.

Suggested Learning Resources:

- Digital devices with assistive technology such as screen magifiera tactile Rulers and Print and Braille Course Books.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
4.0 GEOMETRY	**4.4 Common Solids** (16 lessons)	By the end of the Sub Strand, the learner should be able to: a) identify common solids from the environment, b) sketch nets of cubes, cuboids, cylinders, pyramids and cones in different situations, c) work out the surface area of the solids from nets of solids in different situations, d) determine the distance between two points on the surface of a solid in different situations, e) make models of hollow and compact solids for skills development, f) promote the use of common solids in real-life situations.	● In groups, learners collect common solids such as cubes, cuboids, cylinders, pyramids and cones from the immediate environment. ● Learners with low vision discuss, open and sketch the nets of hollow solids. Learners with blindness are guided to open the hollow common solids and manipulate their nets then be provided with tactile nets of solids to manipulate and relate them to the solids. ● Learners work out the surface area of solids from nets. ● In groups, learners discuss and practise measuring the distance between any two points on the surface of the solids. Learners with blindness are guided to use a tactile ruler to measure the distance. ● In pairs, learners make models of hollow and compact solids using locally available materials. Hollow solids (containers) may be of cubes, cuboids, cylinders, pyramids or cones. Compact solids (e.g. bricks) may be of cubes, cuboids or cylinders. Learners with blindness to be paired by sighted peers during the activity. ● Learners use digital devices with assistive technology to watch/listen to videos on common solids, nets and draw the solids and nets. ● Learners use other resources such as print or realia to trace or draw nets of solids.	1. How do we use common solids in real life? 2. How do you determine the surface area of solids? 3. How do you determine the volume of common solids?

Core Competencies to be developed:

- Communication and collaboration: The learner influences the team as they discuss and work in groups to collect solids from the environment and suggest improvements.
- Creativity and imagination: The learner looks at a problem in new way as they make the models of different solids.

Values: ● **Responsibility:** The learner enhances diligence and excellence as they work in groups to collect solids and make models.
Pertinent and Contemporary Issues (PCIs): ● Education for Sustainable Development (ESD): The learner acquires life skills as they collect solids from the environment and use locally available materials to make models. ● Life skills and values-Self-esteem: The learner enhances confidentiality as they open nets of solids and make models.
Links to other subjects: ● Pre-Technical Studies: The learner sketches nets of different solids while practising in technical drawing as a learner makes the models of different solids.
Suggested Learning Resources: ● Cubes, cuboids, cylinders, pyramids and cones, tactile nets of solid, tactile ruler, hollow solids (containers), compact solids (e.g. bricks), digital devices with assistive technology such as screen magnifiers, Print and Braille course books.

Suggested Assessment Rubric for learners with Low vision

Level **Indicator**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to: • construct regular and irregular polygons up to hexagon in different situations. • construct Escribed Circle and Inscribed Circle in different situations • plot out points on a Cartesian plane • work out the surface area of the solids from nets of solids in different situations.	The learner demonstrates the four skills.	The learner demonstrates three skills.	The learner demonstrates two skills.	The learner demonstrates one or no skill.

Suggested Assessment Rubric for Learners with blindness

Level / Indicator	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to: • interpret regular and irregular polygons up to hexagon in different situations. • interpret Escribed Circle and Inscribed Circle in different situations. • interpret linear scales in statement form in different situation • work out the surface area of the solids from nets of solids in different situations.	The learner demonstrates the four skills.	The learner demonstrates three skills.	The learner demonstrates two skills.	The learner demonstrates one or no skill.

STRAND 5.0: DATA HANDLING AND PROBABILITY

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
5.0 **DATA HANDLING AND PROBABILITY**	**5.1 Data Presentation and Interpretation (10 lessons)**	By the end of the Sub Strand, the learner should be able to: a) draw bar graphs of data from real-life situations, *(for learners with low vision)* b) interpret bar graphs of data from real-life situations, *(for learners with blindness)* c) draw line graphs of given data from real-life situations, *(for learners with low vision)* d) interpret line graphs of data from real-life situations, *(for learners with blindness)* e) identify the mode of a set of discrete data from real-life situations, f) calculate the mean of a set of discrete data from real-life situations, g) determine the median of a set of discrete data from real-life situations, h) promote use of data representation and interpretation in real-life situations.	● In groups, learners collect data from the immediate environment or experiences, for example size of shoes, height or test scores. ● Learners with low vision use a suitable scale to represent the data in bar graphs. Learners with blindness are guided to manipulate and interpret tactile bar graphs to identify the scale on the axes. ● In groups, learners with low vision discuss and interpret bar graphs while learners with blindness manipulate and interpret bar graphs. ● Learners with low vision discuss and represent data in line graphs while learners with blindness manipulate and interpret tactile line graphs. ● In groups, learners discuss and interpret print or tactile line graphs. ● In groups, learners recognise the mode from a given set of discrete data. ● In groups, learners discuss and work out the average from different sets of discrete data and relate it to the mean. ● In groups, learners carry out different activities that involve getting the median position. For example, where possible learners use the hand to identify the middle finger in reference to the position. ● Learners arrange given data in ascending order and identify the middle value which is the median. ● Learners use digital devices with assistive technology to create bar graphs and line	1. Why do we represent data in different ways? 2. How do we determine the mean of data?

			graphs to represent the data, calculate the mean, the mode and the median. ● Learners use other resources to draw bar and line graphs.	

Core Competencies to be developed:

- Communication and collaboration: The learner develops teamwork as they discuss and represent data in line graphs
- Critical thinking and problem solving: The learner develops open mindedness and creativity as they discuss and interpret Bar graphs
- Self-efficacy: The learner enhances confidentiality as they collect data from their own experiences, for example size of shoes, height or test scores.

Values:

- Respect: The learner enhances etiquette as they carry out different activities that involve getting the median position. For example, where possible a learner uses the hand to identify the middle finger in reference to the position.

Pertinent and Contemporary Issues (PCIs):

- Environmental education: The learner appreciates the gift of nature as they collect data from the immediate environment or experiences, for example size of shoes, height or test scores.

Links to other subjects:

- Social Studies: The learner discusses with peers and works out the average from different sets of discrete data such as populations and relates it to the mean.

Suggested Learning Resources:

- Tactile bar graphs, tactile line graphs, Print line graphs, digital devices with assistive technology such screen magnifiers and readers, adapted keyboard, Print and Braille course Book.

Strand	Sub Strand	Specific Learning Outcome	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
5.0 DATA HANDLING AND PROBABILITY	**5.2 Probability (**7 lessons**)**	By the end of the Sub Strand, the learner should be able to: a) identify events involving chance in real-life situations, b) perform chance experiments in different situations, c) write the experimental probability outcomes in different situations, d) express the probability outcomes in fractions in different situations, e) express the probability outcomes in decimals or percentages in different situations, f) use IT and other materials to play games involving probability g) recognise events that happen by chance in real-life situations.	● In groups, learners discuss daily events that are likely or unlikely to happen or will not happen. ● In groups, learners discuss and carry out different chance experiments like flipping the coin, tossing the dice or drawing coloured balls from a bag, one ball at a time. Learners with blindness are paired with sighted peers during the activity. ● Learners record the probability of the chance outcomes in fractions, decimals and percentages. ● Learners use digital device with assistive technology or other resources to play games involving probability	1. How do we consider chances that an event is likely to happen? 2. Why is probability important in real-life situations?

Core Competencies to be developed:

- Communication and collaboration: The learner develops speaking skills and teamwork as they discuss daily events that are likely/unlikely to happen/will not happen.
- Critical thinking and problem solving: The learner develops researching skills as they discuss and carry out different chance experiments like flipping the coin.
- Self-efficacy: The learner enhances confidentiality as they discuss and carry out different chance experiments like flipping the coin and avoid harmful practices of gambling.

Values:

- Responsibility: The learner enhances diligence as they use digital devices or other resources such as coins, balls in the study of probability.

Pertinent and Contemporary Issues (PCIs):

- Education for Sustainable Development (ESD): The learner discusses daily events that are likely/unlikely to happen/will not happen that may relate to the environment.

Links to other subjects:

- Social Studies: The learner discusses daily events that are likely/unlikely to happen/will not happen that may involve the weather.

Suggested Learning Resources:

- Print and Braille course Book**,** coin, dice and old bags and digital devices with assistive technology such as adapted keyboards, screen magnifiers and screen readers.

Suggested Assessment Rubric

Level / Indicator	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to: • draw bar graphs of data from real-life situations, *(for learners with low vision)* OR interpret bar graphs of data from real-life situations, *(for learners with blindness)* • calculate the mean of a set of discrete data from real-life situations, • determine the median of a set of discrete data from real-life situations, • perform chance experiments in different situations,	The learner demonstrates the four skills.	The learner demonstrates three skills.	The learner demonstrates two skills.	The learner demonstrates one or no skill.

COMMUNITY SERVICE-LEARNING PROJECT

Introduction

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

CSL Skills to be covered:

i) **Leadership**: A learner develops leadership skills as they undertake various roles during preparation.

ii) **Financial Literacy and Entrepreneurship Skills:** A learner 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:** A learner will be expected to identify a problem or pertinent issue in the community and indicate how the problem will be solved. They will also acquire skills on how to report their findings.

iv) **Communication:** A learner indicates reporting mechanisms to be used during the actual project e.g., how they intend to communicate with members of the community, either online or offline.

v) **Citizenship:** A learner engages in the CSL activities for this Grade, they will be vested with the rights, privileges and duties of a citizen, hence giving them a sense of belonging and attachment to the nation. They will also be empowered to engage and assume active roles in shaping a more peaceful, tolerant and inclusive society.

vi) **Life Skills Education:** A learner will be equipped with life skills, including decision making, assertiveness, effective communication, problem solving and stress management. This will enable them to manage interpersonal relationships, develop leadership skills as well as discover and grow their talents.

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

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

		● Learners assign roles to be carried out by all group members ● Learners reflect on how the project preparation enhanced learning.	

Key Component of CSL developed

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

Core competencies to be developed:

- **Communication and collaboration**: A learner develops speaking skills and teamwork as they make the preparations in groups and conduct discussions on best ways of carrying out the project.
- **Self-efficacy**: A learner develops the skills of self-awareness and leadership as they undertake the CSL project
- **Creativity and imagination**: A learner will come up with creative ways of solving the identified community problem
- **Critical thinking and problem solving**: A learner will demonstrate autonomy in identifying a community need, exploring plausible solutions and making necessary preparations to address the problem.
- **Digital literacy**: A learner can use technology as they research on a community problem that they can address.
- **Learning to learn:** A learner gains new knowledge and skills as they identify a community problem to be addressed and make preparations to carry out the project.
- **Citizenship**: A learner demonstrates responsible decision making as they choose a PCI that needs immediate attention in the community.

Values:

- **Integrity**: A learner enhances discipline as they carry out research using digital devices and print media as they identify a community problem to address.
- **Respect:** A learner enhances patience as they brainstorm on pertinent and contemporary issues in their community that need attention.

Pertinent and Contemporary Issues (PCIs):

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

Suggested Learning Resources:

- Digital devices with assistive technology.

Suggested Assessment Rubric

Level / Indicator	Exceeds Expectation	Meets Expectation	Approaches Expectation	Below Expectation
Ability to: • identify a problem in the community through research, • plan to solve the identified problem in the community, • design solutions to the identified problem, • solve the identified problem in the community.	The learner demonstrates the four skills.	The learner demonstrates three skills.	The learner demonstrates two skills.	The learner demonstrates one or no skill.

APPENDIX 1:

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

Strand	Sub Strand	Suggested Assessment Methods	Suggested Non-Formal Activities
NUMBERS	Integers	● Class activities ● Class written tests in print or braille ● Home or extended assignments or activities ● Projects	Prepare or improvise number line games on charts
	Fractions	● Class activities ● Class written tests in print or braille ● Home or extended assignments or activities	
	Decimals	● Class activities ● Class written tests in print or braille ● Home or extended assignments or activities	
	Squares and square roots	● Class activities ● Class written tests in print or braille ● Home or extended assignments or activities	
	Rates, ratios, proportions and percentages	● Class activities ● Class written tests in print or braille ● Home or extended assignments or activities	
ALGEBRA	Algebraic Expressions	● Class activities ● Class written tests in print or braille ● Home or extended assignments or activities ● Project	Carry out activities involving classifying objects in their immediate environment according to given attributes such as similarities or differences. This can be done at home. Take photos and share with class or school. Use the concept of classification of objects to organise and arrange personal items at school and home.
	Linear Equations	● Class activities ● Class written tests in print or braille ● Out of class assignments	

MEASUREMENT	Circles	● Class activities ● Class written tests in print or braille ● Out of class assignments	
	Area	● Class written tests in print or braille ● Out of class assignments or activities	
	Money	● Class activities ● Home or extended assignments or activities ● project	Research, identify and discuss different products/goods that appreciate or depreciate. This can be done through online or other forms of searches. Create a table of products and the two prices: one for cash payment, the other for hire purchase payment. This is to inform purchasing decisions that will protect consumers from products that highly lose value with time.
GEOMETRY	Geometric constructions	● Class activities ● Class written tests in print or braille ● Out of class assignments or activities	
	Coordinates and graphs	● Class activities ● Class written tests in print or braille ● Out of class assignments or activities	
	Scale drawing	● Class activities ● Class written tests in print or braille ● Home or extended assignments or activities	
	Common solids	● Class activities ● Class written tests in print or braille ● Home or extended assignments or activities ● project	Make models of hollow and compact solids using locally available materials. Hollow solids (containers) may be of cubes, cuboids, cylinders, pyramids or cones and can be improvised from existing resources. Compact solids (e.g. sample bricks) may be of cubes, cuboids or cylinders.
DATA HANDLING AND PROBABILITY	Data handling	● Class activities ● Class written tests in print or braille ● Home or extended assignments or activities	

	Probability	● Class activities ● Class written tests in print or braille ● Home or extended assignments or activities	

APPENDIX 2:

USE OF ICT TOOLS

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

1. Learner digital devices (**LDD**) m
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.