KENYA INSTITUTE OF CURRICULUM DEVELOPMENT

A Skilled and Ethical Society

JUNIOR SCHOOL CURRICULUM DESIGN

MATHEMATICS

GRADE 9

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NATIONAL GOALS OF EDUCATION

Education in Kenya should:

1. **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.

2. **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.

   i) **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.

   ii) **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.

   iii) **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.

3. **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.

4. **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.

5. **Promote social equity and responsibility**
   Education **respect** 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.

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

7. **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.

8. **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
1.	English	5
2.	Kiswahili / Kenya Sign Language	4
3.	Mathematics	5
4.	Religious Education	4
5.	Social Studies	4
6.	Integrated Science	5
7.	Pre-Technical Studies	4
8.	Agriculture and Nutrition	4
9.	Creative Arts and Sports	5
	Pastoral /Religious Instructional Program	1
Total		**40 + 1**

LEARNING OUTCOMES FOR JUNIOR SCHOOL

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

ESSENCE STATEMENT

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

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

SUBJECT GENERAL LEARNING OUTCOMES

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

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

STRAND: WHOLE NUMBERS

Sub strand: Integers

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 NUMBERS	1.1 **INTEGERS (5 LESSONS)**	By the end of the sub-strand the learner should be able to; a) perform basic operations on Integers in different situations b) work out combined Operations on Integers in different situations c) apply Integers to real life situations d) use IT or other resources to learn more on integers e) appreciate use of integers in real life situations.	The learner is guided to: • discuss and work out basic operations on integers using number cards and charts. Play games involving numbers and operations. Pick integers and perform all basic operations. • work out combined operations of integers in the correct order • carry out activities such as reading temperature changes in a thermometer and discuss how to record it. Consider temperatures below zero points. They should consider cases of use of integers in real life. • use IT and other resources such as print to carry out operations on integers. • play creative games that involve integers.	1. How do we carry out operations of integers in real life situations? 2. How do we apply integers in daily activities?

Core Competencies to be developed; • **Critical thinking and problem solving-** interpretation and inference: as learners work out combined operations of integers in the correct order • **Learning to learn-** organizing own learning**;** as learners carry out activities such as reading temperature changes in a thermometer and discuss how to record it. • **Digital literacy**- interacting with technologies; as learners use IT devices to determine temperature.
Values • **Respect;** as learners work in pairs/groups to carry out activities such as reading temperature changes in a thermometer and discuss how to record it. • **Unity**; as learners work towards achieving set goals of reading thermometer.
PCIs Environmental education; as learners read temperature changes in a thermometer that tell about the climate
Link to other subjects Learners discuss in groups using language skills on how to work out combined operations of integers in the correct order.

Sub strand: Cubes and cube roots

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
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)** Work out cubes of numbers by multiplication in real life situations	The learner is guided to: • use stacks of cubes to demonstrate the concept of cube and cube roots. • demonstrate stacking of cubes.	1. How do we work out the cubes of numbers? 2. How do we work out the cube roots of numbers?

		b) Determine cubes of numbers from mathematical tables in different situations **c)** Determine cube roots of numbers by factor method in different situations **d)** Determine cube roots of numbers from mathematical tables in different situations **e)** Apply cubes and cube roots in real life situations **f)** Work out cubes and cube roots using IT devices	• discuss the volume of a cube and determine both the cube and cube root and relate the two. • read the cube of numbers from mathematical tables and relate to cube roots • use IT devices to determine cube and cube roots of numbers.	3. Where do we apply cubes and cube roots in real life situations?

Core Competencies to be developed;

- Communication and collaboration- speaking and listening; as learners work in groups to use stacks of cubes to demonstrate the concept of cube and cube roots.
- Imagination and creativity- open mindedness and creativity; as learners determine both the cube and cube root and relate the two.

Values

- **Respect**; as learners appreciate each other's contribution in pairs/groups discussion.

Learners use stacks of cubes to demonstrate the concept of cube and cube roots, relate to objects in the environment.

Link to other subjects

Learners use new terms in reading measurements of length in cubes as learnt in Languages.

Sub strand: Matrix

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 ALGEBRA	**1.3 INDICES AND LOGARITHMS** (6 LESSONS)	By the end of the sub- strand the learner should be able to; a) Express numbers in index form in different situations. b) Generate the laws of Indices in different situations c) Apply the laws of indices in different situations d) Relate Powers of 10 to common logarithms in different situations e) Use IT to learn more on indices and common logarithms f) Appreciate use of indices and logarithms in real life situations	Learners is guided to: • discuss indices and identify the base. • show the laws of indices using multiplication and division. • use the laws of indices to work out indices • discuss and relate powers of 10 to common logarithms • use IT to work out common logarithms or use mathematical tables	How do we express numbers in powers?

Core Competencies to be developed;

- Critical thinking and problem solving; as learners show the laws of indices using multiplication and division.
- Self-efficacy; as learners discuss and relate powers of 10 to common logarithms

Values • **Responsibility**; as learners take their roles in turns to lead the groups in discussions on indices. • **Unity**; as learners measure capacity in groups.
PCIs Learners relate self-awareness to their own ides as they discuss concept of Indices.
Link to other subjects Learners express numbers as indices and powers as used in Integrated Science.

Sub strand: Matrix

Strand	Sub-Strand	Specific Learning Outcome	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 NUMBERS	**1.4 COMPOUND PROPORTIONS AND RATES OF WORK (12 LESSONS)**	By the end of the sub- strand, the learner should be able to; a) divide quantities into proportional parts in real life situations b) relate different ratios in real life situations c) work out compound proportions using ratio method in different situations. d) calculate rates of work in real life situations	Learners is guided to: • discuss and divide quantities into proportional parts and express as a fraction • compare and write different ratios • determine compound proportions using ratios • work out rates of work. • play games on rates of work using IT devices.	1. What are proportions? 2. Why do we work fast?

		e) use IT devices to learn more on Compound proportions and rates of work f) appreciate use of Compound proportions and rates of work in real life situations.		

Core Competencies to be developed;

- **Citizenship-** active community life skills; as learners work in pairs/groups to discuss and divide quantities into proportional parts and express as a fraction.
- **Critical thinking and problem solving-** interpretation and inference; as learners work out rates of work.

Values

- **Responsibility**; as learners commit to working out answers of given tasks on rates.
- **Respect** for self and others; as learners in pairs/groups and work out rates of work.

PCIs

Self-esteem; as learners device personal strategies to estimate products in multiplication.

Link to other subjects

Agriculture and nutrition helps learners to estimate harvests, seeds or fertilizer required for sowing or application as part of rates of work.

Level / Indicator	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to Work out combined Operations on Integers	Works out combined Operations on Integers	Works out combined Operations on Integers	Works out combined Operations on Integers partially accurately	Works out combined Operations on Integers

	accurately and Systematically	accurately and Systematically		with continuous support
Ability to Work out cubes and cue roots of numbers by multiplication and from mathematical tables	Works out cubes and cube roots of numbers by multiplication and from mathematical tables accurately and systematically	Works out cubes and cube roots of numbers by multiplication and from mathematical tables accurately	Works out cubes or cube roots of numbers by multiplication and from mathematical tables accurately	Works out cubes of numbers by multiplication or from mathematical tables accurately
Generate and apply the laws of Indices	Generates and applies the laws of Indices correctly and Systematically	Generates and applies the laws of Indices correctly	Generates or applies the laws of Indices correctly	Generates the laws of Indices correctly
Relate Powers of 10 to common logarithms	Relates Powers of 10 to common logarithms Comprehensively	Relates Powers of 10 to common logarithms accurately	Relates Powers of 10 to common logarithms partially accurately	Relates Powers of 10 to common logarithms with continuous support
Divide quantities into Proportional parts	divides quantities into Proportional parts Precisely	Divides quantities into Proportional parts correctly	Divides quantities into Proportional parts partially correctly	Divides quantities into Proportional parts with continuous support
Relate different ratios	Relates different ratios Comprehensively	Relates different ratios accurately	Relates different ratios partially accurately	Relates different ratios Calculate rates of work with continuous support
Work out Compound proportions using ratio method	works out Compound proportions using ratio method Systematically	Work out Compound proportions using ratio method accurately	Work out Compound proportions using ratio method partially accurately	Works out Compound proportions using ratio method with continuous support

Calculate rates of work	calculates rates of work Systematically	Calculate rates of work correctly	Calculate rates of work partially correctly	Calculates rates of work with continuous support

STRAND 2.0: ALGEBRA

Strand	Sub-strand	Specific Learning Outcome	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) identify a matrix in different situations. b) determine the order of a matrix in different situations. c) determine the position of items in a matrix in different situations. d) determine compatibility of matrices in addition and subtraction.	The learner is 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. ● arrange items in rows and columns and discuss how to represent a matrix. ● organize objects in rows and columns and give the order of the matrix in terms of row and columns (row ***x*** column). ● discuss and identify the position of each item or element in terms of row and column. ● discuss and identify matrices that have equal number of rows and equal number	How do we use matrices in real life situations?

		e) carry out addition and subtraction of matrices in real life situations. f) reflect on the use of matrices in real life situations.	of columns (same order) for compatibility in addition and subtraction. ● 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 - as learners discuss use of tables to represent matrices.
- Learning to learn - as learners arrange items or elements in rows and columns to form matrices.

Values:

Integrity - as learners organize objects in rows and columns and give the order of the matrix

Pertinent and Contemporary Issues:

- Social and economic issues - as learners discuss the use of tables such as football league tables and shopping lists.
- Citizenship - as learners discuss how to use travel schedules to different places.

Link to other subjects

Learners generate tables of results in sports and refer to league schedules and relate this to sporting activities in creative Arts and Sports.

Strand	Sub-Strand	Specific Learning Outcome	Suggested Learning Experiences	Suggested Key Inquiry Questions
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) identify the gradient in real life situations. b) determine the gradient of a line from two known points. c) determine the equation of a straight line given two points. d) determine the equation of a straight line from a known point and a gradient. e) express the equation of a straight line in the form of $y = mx + c$ f) interpret the equation $y = mx + c$ in different situations. g) determine the x and y intercepts of a straight line. h) recognize the use of equations of straight lines in real life.	The learner is guided to; ● discuss steepness in relation to gradient from the immediate environment. ● incline a ladder at different positions on the wall to demonstrate change in steepness of gradient. Discuss and compare the positions that the ladder is steeper. ● observe and climb up and down places such as the stairs or hills and relate to gradients. ● work out the equation of a straight line given two points or given a point and a gradient. ● discuss and rewrite the equation of a straight line as $y = mx + c$. Explain the variables and constants in the equation. ● work out the value of x when y is zero and the value of y when is zero.	How do we use gradient or steepness in our daily activities?

			● use IT or other resources to show different hills and mountains and discuss steepness.	

Core competencies to be developed:

- Digital literacy - as learners IT or others resources to explore steepness or gradient of places.
- Learning to learn - as learners place the ladder at different points on the ground as they discuss and compare steepness.

Values:

Integrity - as learners observe gradient/steepness in staircases in buildings, bridges or ramps.

Pertinent and Contemporary Issues:

Safety - as learners climb up and down places such as the stairs or hills and relate to gradients.

Link to other subjects:

- Integrated science helps learners relate use the ladder to make work easier by using different gradients.
- Pre-technical Studies as learners discuss and compare the gradients of parallel and perpendicular lines as it is done in technical drawing.

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) solve linear inequalities in one unknown. b) represent linear inequalities in one unknown graphically. c) represent linear inequality in two unknowns graphically. d) apply linear inequalities to real life situations. e) reflect on the use of linear inequalities in real life.	The learner is guided to; ● discuss why sometimes resources are shared unequally. ● discuss simple inequality statements, form and work out the inequalities in one unknown. ● discuss and generate a table of values and draw linear inequalities in one unknown. Indicate and discuss the region that satisfies the inequalities. ● discuss and generate a table of values and draw linear inequalities in two unknowns. Indicate and discuss the region that satisfies the inequalities. ● discuss and work out linear inequalities that involve real life cases ● use IT or other graphing tools to present linear inequalities	1. How do we represent linear inequalities in graphs? 2. How do we use linear inequalities in real life situations?
Core competencies to be developed: ● Digital literacy - as learners use IT resources to present linear inequalities. ● Communication and collaboration - as learners discuss and generate table of values and draw linear inequalities.				

Values: Social justice - as learners apply concepts of inequalities and equity in sharing available resources real in life situations.
Pertinent and Contemporary Issues: Citizenship - as learners discuss and indicate the regions that satisfy inequalities.
Link to other subjects: Social studies - as learners discuss inequality statements that may involve distribution of resources.

STRAND 3.0: MEASUREMENTS

Strand	Sub-strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
3.0 Measurements	**3.1 Area** (8 lessons)	By the end of the sub- strand the learner should be able to; a) calculate the area of a pentagon and a hexagon in different situations. b) work out the surface area of triangular and rectangular based prisms. c) work out the surface area of triangular, rectangular and square based pyramids. d) calculate the area of a sector and segment of a circle. e) work out the surface area of a cone in real life situations. f) calculate the surface area of a sphere in real life situations.	The learner is guided to; ● discuss the properties of regular polygons and use cut outs to work out the area of pentagons and hexagons. ● collect from the environment objects that are spheres, cones/funnels, pyramids, prisms and frustums. ● discuss and sketch the nets of the solids. ● use models of prisms to work out the surface area of prisms. ● open up the net and draw the faces of a pyramid. Use the relevant formulas of area of plane figures to work out the surface area of the pyramid. ● draw a circle with a sector, a chord and a segment and discuss the relationship and make cut outs of a sector and a segment. Determine the area of a sector and a segment. ● open the cone to form a net and determine the curved surface area of a cone. Work out the surface area of a closed and an open cone.	How do we determine the area of different surfaces?

		g) recognize the use of area in real life situations.	● use relevant formulas to work out the surface area of different sizes of spherical balls. ● use IT or other resources to sketch different models and nets.	
Core competencies to be developed: ● Communication and collaboration - as learners 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 - as learners open nets of different models and work out surface area.				
Values: Responsibility - as learners take care and work out surface area using models and open nets of different objects.				
Pertinent and Contemporary Issues: Patriotism - as learners collect objects from the environment, use and dispose of them safely.				
Link to other subjects: Pre-Technical Studies as learners use models and open nets of different objects.				

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Strand	**Sub-strand**	**Specific Learning Outcome**	**Suggested Learning Experiences**	**Suggested Key Inquiry Question(s)**
3.0 Measurements	**3.2 Volume of Solids** (8 lessons)	By the end of the sub-strand the learner should be able to; a) work out the volume of a triangular and rectangular based prisms.	The learner is guided to; ● collect different containers and objects. This may include prisms, pyramids, cones, funnels and balls. ● identify and discuss the model of a prism. Using	1. How do we determine the volume of different solids? 2. How do we use the volume

		b) calculate the volume of a triangular, rectangular and squares based pyramids.. c) work out the volume of a cone in real life situations. d) determine the volume of a frustum in real life situations. e) calculate the volume of a sphere in real life situations. f) promote use of volume and capacity of different containers in real life situations.	the relevant formulas, determine the volume of a prism. ● use relevant formulae to work out the volume of pyramids and cones. ● identify and work out the volume of models of a pyramid. Cut the pyramid into two parts to get a frustum and a small pyramid and determine the volume of the frustum using relevant formula. ● Play any games involving different sizes of balls and work out volume of a sphere. ● use IT or other resources to determine the volumes of solids.	of solids in real life situations?
Core competencies to be developed: ● Critical thinking and problem solving - as learners identify and work out the volume of a frustum from a pyramid ● Creativity and Imagination - as learners identify, discuss and work out volume of solids.				
Values: ● Responsibility - as learners take care of the models of pyramids, cones, and spheres.				

● Patriotism - as learners collect objects from the environment to determine and discuss models/objects for different volumes of solids.
Pertinent and Contemporary Issues: ● Environmental Education - as learners take care of the environment while collecting the containers and objects. ● Safety - as learners collect containers and objects cautiously.
Link to other subjects; Creative Arts and sports - as learners make models of pyramids, cones/funnels and spheres/balls from available materials.

Strand	**Sub-strand**	**Specific Learning Outcomes**	**Suggested Learning Experiences**	**Suggested 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) convert units of mass from one form to another in different situations. b) relate mass and weight in real life situations. c) determine mass, volume and density in different situations. d) apply density to real life situations. e) recognize the use of density in daily life.	The learner is guided to; ● discuss different instruments and tools used in weighing materials or objects and relate to consumer awareness and protection. ● Collect and weigh different materials or objects and change one unit of mass to another. ● discuss the relationship between mass and weight. ● carry out activities relating mass and volume to density using containers or different substances. ● discuss and find the density of different materials or objects. ● work out mass, volume and density using IT or other resources.	How do you weigh materials and objects?
Core competencies to be developed: ● Communication and collaboration - as learners discuss the relationship between mass and weight. ● Creativity and imagination - as learners determine the density of different materials or objects. ● Digital literacy - as learners use IT devices to determine the mass, volume and density of different objects.				
Values: ● Integrity - as learners give correct masses and weights of different material and objects.				

● Responsibility - as learners work and take care of weighing machines and other resources.
Pertinent and Contemporary Issues: ● Education for Sustainable Development (ESD) - Careers in business such as shop keeping. ● Self-awareness - as learners weigh themselves for health purposes.
Link to other subjects: ● Home Science - as learners weigh different quantities for a variety of recipes. ● Integrated science - as learners use machines and tools which involve weighing and balancing.

Strand	**Sub-strand**	**Specific Learning Outcomes**	**Suggested Learning Experiences**	**Suggested Suggested Key Inquiry Question(s)**
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) work out speed in km/h and m/s in real life situations. b) work out average speed in real life situations. c) determine velocity in real life situations. d) work out acceleration in real life situations.	The learner is guided to; ● engage in activities that will involve measuring distances and time, for example running track events to determine speed. ● discuss and relate distance and time. ● discuss the difference between velocity and speed. ● Discuss and determine acceleration from track events in school or community.	1. How do we observe speed in daily activities? 2. Why does time vary in different places of the world?

		e) identify the longitudes on the globe. f) relate longitudes to time on the globe. g) determine local time of places on the earth along different longitudes. h) appreciate use of time and distance in real life situations.	● discuss and use maps and models of a globe to work out and relate time of different places on the earth. ● use IT devices to watch videos on the globe, longitudes and time zones in different parts of the earth. ● use other resources such as maps to locate different places (cities) on the earth and discuss time differences.	

Core competencies to be developed:

- Self-efficacy - as learners participate in track events to measure speed.
- Digital literacy -as learners use IT devices to determine time in different zones in the world.
- Citizenship- global citizenship as learners determine local time in different parts of the world.

Values:

- Integrity- as learners correctly record individual running time during track events and other games.
- Respect - as learners adhere to their lanes on track events and other games.

Pertinent and Contemporary Issues:

- Safety - as learners observe safety measures and time during games and sports.
- Education for Sustainable Development (ESD) - as learners participate and choose careers in games and sporting activities.
- Self-awareness - as learners participate and time themselves in games.

Link to other subjects:

Integrated science - as learners use digital devices to tell time in different zones of the world.

Strand	Sub-strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Suggested Key Inquiry Question(s)
3.0 Measurements	**3.5 Money** (7 lessons)	By the end of the sub- strand, the learner should be able to; a) identify currencies that are used in different countries. b) convert currency from one form to another in real life situations. c) work out import and export duties charged on goods and services. d) work out excise duty charged on goods and services. e) determine value added tax charged on goods and services. f) appreciate use of money in day to day activities.	The learner is guided to; ● use IT 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. ● work out currency exchange from Kenya Shillings to any other currency and vice versa. ● discuss and determine the export and import duty charges on different goods. ● discuss and identify goods that attract excise duty. Determine excise duty. ● use receipts from shopping to discuss and work out VAT on goods and services. ● identify currency exchange rates from different sources including daily papers, IT devices, financial	1. Why do we change currencies from one form to another? 2. What are the types of taxes the government levy on its citizens?

			institutions and relate this to consumer awareness and protection.	

Core competencies to be developed:

- Global Citizenship - as learners of different currencies of the world.
- Digital Literacy - as learners use digital devices to learn on exchange rates for foreign currency.

Values:

- Integrity - as learners accurately work out currency, import and exchange rates.
- Social Cohesion - as learners work and appreciate exchange rates for other countries.

Pertinent and Contemporary Issues:

- Financial Literacy - as learners learn the currencies used in different countries
- Education for Sustainable Development (ESD) - as learners choose careers in business, imports and exports.

Link to other subjects:

Pre-technical studies - as learners work out VAT and currency exchange.

Strand	Sub-strand	Specific Learning Outcome	Suggested Learning Experiences	Suggested 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) approximate quantities in measurements in different situations. b) determine errors using estimations and actual measurements of quantities. c) determine percentage errors using actual measurements of quantities	The learner is guided to; ● carryout activities of measurements of different quantities such as length, area, volume, capacity and mass using arbitrary units. ● Estimate and measure different quantities using appropriate instruments. compare the estimates and the actual measurements and determine the error. ● work out the percentage error from the estimated and the actual measurements	How do we estimate measurements of different quantities?

		d) appreciate approximations and errors in real life situations.	● work out errors using IT devices or other resources and relate this to consumer awareness.	

Core competencies to be developed:

- Creativity and imagination - as learners carry out measurements of different quantities and discuss error.
- Digital literacy - as learners use IT devices as they compute errors.

Values:

- Integrity - as learners measure different quantities and minimize errors.
- Responsibility - as learners take care of tools for measuring different quantities.

Pertinent and Contemporary Issues:

Safety - as learners handle measuring tools with care.

Link to other subjects:

Integrated science - as learners measure different quantities that may involve errors as they carry out experiments.

Assessment Rubric

Level / Indicators	Exceeds Expectation	Meets Expectation	Approaches Expectation	Below Expectation
Ability to calculate the Area of a pentagon and a hexagon.	Calculates the area of a pentagon and a hexagon correctly and Proficiently.	Calculates the area of a pentagon and a hexagon correctly	Calculates the area of a pentagon or a hexagon correctly	Calculates the area of a pentagon correctly
Ability to work out the surface Area of a prism and pyramid.	Works out the surface area of a prism and a pyramid accurately and systematically.	Works out the surface area of a prism and a pyramid accurately	Works out the surface area of a prism or a pyramid accurately	Works out the surface area of a prism accurately
Ability to calculate the area of a sector and segment of a circle.	Calculates the area of a sector and segment of a circle correctly and systematically.	Calculates the area of a sector and segment of a circle correctly	Calculates the area of a sector or segment of a circle correctly	Calculates the area of a sector of a circle correctly
Ability to work out the surface area of a cone and a sphere.	Works out the surface area of a cone and a sphere accurately and systematically.	Works out the surface area of a cone and a sphere accurately	Works out the surface area of a cone or a sphere accurately	Works out the surface area of a cone accurately
Ability to work out the Volume a triangular, rectangular and squares based prisms and pyramids.	Works out the volume of a triangular, rectangular and squares based prisms and pyramids correctly and systematically.	Works out the volume of a triangular, rectangular and squares based prisms and pyramids correctly	Works out the volume of a triangular, rectangular or squares based prisms and pyramids correctly	Works out the volume of a triangular, rectangular based prisms correctly

Ability to work out the Volume of a cone, frustum and sphere.	Works out the volume of a cone, frustum and sphere correctly and systematically.	Works out the volume of a cone, frustum and sphere correctly	Works out the volume of a cone, frustum or sphere correctly	Works out the volume of a cone correctly
Ability to determine the mass, volume and density.	Determines mass, volume and density correctly and systematically	Determines mass, volume and density correctly	Determines mass, volume or density correctly	Determines mass or volume correctly
Ability to work out speed in Km/h and m/s, velocity and acceleration.	Works out speed in Km/h and m/s, velocity and acceleration accurately and systematically	Works out speed in Km/h and m/s, velocity and acceleration accurately	Works out speed in Km/h and m/s, velocity or acceleration accurately	Works out speed in Km/h and m/s, accurately
Ability to determine local time of places on the earth along different longitudes.	Determines local time of places on the earth along different longitudes correctly and systematically	Determines local time of places on the earth along different longitudes correctly	Determines local time of places on the earth along different longitudes partially correctly	Determines local time of places on the earth along different longitudes with continuous support
Ability to identify currencies used in different countries and convert currency from one form to another	Identifies currencies that are used in different countries and convert currency from one form to another accurately and comprehensively	Identifies currencies that are used in different countries and convert currency from one form to another accurately	Identifies currencies that are used in different countries or convert currency from one form to another accurately	Identifies currencies that are used in different countries accurately

Ability to work out import, export and excise duties	Works out import, export and excise duties correctly and systematically	Works out import, export and excise duties correctly	Works out import, export or excise duties correctly	Works out import duties correctly
Ability to determine Value Added Tax	Determines Value Added Tax correctly and systematically	Determines Value Added Tax correctly	Determines Value Added Tax partially correctly	Determines Value Added Tax with continuous support
Ability to approximate quantities in measurements	Approximates quantities in measurements Accurately and systematically	Approximates quantities in measurements Accurately	approximate quantities in measurements Partially Accurately	Approximate quantities in measurements with continuous support
Ability determine errors using estimations and actual measurements of quantities.	Determines errors using estimations and actual measurements of quantities Accurately and systematically.	Determines errors using estimations and actual measurements of quantities accurately.	Determines errors using estimations or actual measurements of quantities accurately.	Determines errors using estimations accurately

STRAND 4.0: GEOMETRY

Strand	**Sub-strand**	**Specific Learning Outcomes**	**Suggested Learning Experiences**	**Suggested Key Inquiry Question(s)**
4.0 Geometry	**4.1 Coordinates and Graphs** (6 lessons)	By the end of the sub-strand, the learner should be able to; a) plot out points on a Cartesian plane	The learner is guided to; ● work in groups and locate the point of intersection of the x coordinate and the y- coordinates on a Cartesian plane.	1. How do we draw graphs of straight lines?

		b) draw a straight line graph given an equation. c) draw parallel lines on the Cartesian plane. d) relate the gradients of parallel lines. e) draw perpendicular lines on the Cartesian plane. f) relate the gradients of perpendicular lines. g) apply graphs of straight line in real life situation	● generate a table of values from equation a of a straight line, plot and join the points to form a straight line. ● Generate table of values for each of the given equations, plot and join them to form straight lines on the Cartesian plane ● work out the gradients of each of the lines and compare them to establish their relationship of parallelism. ● Generate table of values for each of the given equations of perpendicular lines, plot and join them to form straight lines on the Cartesian plane ● work out the gradients of each of the lines and compare them to establish the relationship of perpendicular lines.	2. How do we interpret graphs of straight lines?
Core Competencies to be developed: ● Communication and collaboration - learners work in groups to locate the point of intersection of straight lines ● Critical thinking and problem solving - as learners generate a table of values.				
Values: Responsibility - as learners take care of graphing instruments and other resources.				
Pertinent and Contemporary Issues:				

- Education for Sustainable Development (ESD) - as learners generate tables of values and draw graphs of straight lines.
- Safety - as learners handle graphing instruments with sharp ends.

Link to other subjects:
Integrated Science - as learners plot graphs of straight lines in different quantities.

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
4.0 Geometry	**4.2 Scale Drawing** (14 lessons)	By the end of the sub-strand, the learner should be able to; a) identify compass and true bearings in real life situations. b) determine the bearing of one point from another in real life situations. c) locate a point using bearing and distance in real life situations. d) identify angles of elevation in real life situations. e) determine angles of elevation in different situations. f) identify angles of depression in real life situations. g) determine angles of depression in different situations. h) apply scale drawing in simple surveying.	Leaner is guided to: ● draw and discuss the compass directions and relate to the compass and true North bearings. ● discuss and locate places from different points using bearings. ● discuss and locate a place using bearing and distance. Sketch and use scale drawing to show the position of places from given points. ● carryout different activities involving angles of elevation, for example observing different objects or points that are above. Discuss, sketch and make a scale drawing to determine the angles of elevation. ● Carryout different activities involving angles of depression, for example observing different objects or points that are below.	How do we use scale drawing in real life?

		i) appreciate the use of scale drawing in real life situations.	● discuss, sketch and make a scale drawing to determine the angles of depression. ● discuss and use scale drawing in simple surveying. ● observe maps or watch videos on bearings and simple surveying.	
Core competencies to be developed: ● Creativity and imagination - as learners sketch and determine angles of elevation and depression ● Citizenship - as learners use scale drawing in simple surveying				
Values: ● Unity - as learners sketch and agree on points in simple surveying. ● Social Cohesion - as learners observe maps and watch videos on land surveying.				
Pertinent and Contemporary Issues: Learners discuss possible Careers in scale drawing and surveying.				
Link to other subjects: Social studies helps learners work in groups to observe maps in surveying in locating bearing.				

Strand	Sub-strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
4.0 Geometry	**4.3 Similarity and Enlargement** (10 lessons)	By the end of the sub- strand, the learner should be able to; a) identify similar figures and their properties. b) draw similar figures in different situations. c) determine properties of enlargement of different figures. d) apply properties of enlargement to draw similar objects and their images. e) determine the linear scale factor of similar figures. f) promote use of similarity and enlargement in real life situations.	The learner is guided to; ● collect objects and sort according to similarity. Discuss and note down properties of similar objects. ● use properties of similar objects to scale-draw similar figures. ● discuss and identify properties of enlargement. ● use properties of enlargement to represent objects and their images. ● determine the linear relationship of similar figures and objects. ● enlarge objects and figures using IT devices	1. What are similar objects? 2. How do we use enlargement in real life situations?
Core Competencies to be developed: ● Critical thinking and problem solving - as learners draw similar and enlarged objects and figures.				

● Digital literacy - as learners learn, use digital devices to enlarge objects and figures.
Values: ● Responsibility - as learners collect similar objects and take care of them in the learning process. ● Social cohesion - as learners work in groups to draw similar objects and figures.
Pertinent and Contemporary Issues: Environmental Education -as learners collect similar objects from the environment.
Link to other subjects: Pre-Technical Studies contribute to learners scale-drawing similar figures and objects.

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
4.0 Geometry	**4.4 Trigonometry** (8 lessons)	By the end of the sub- strand, the learner should be able to; a) identify angles and sides of right angled triangles in different situations. b) identify Sine, Cosine and Tangent ratios from a right angled triangle in different situations. c) read tables of trigonometric ratios for acute angles. d) determine trigonometric ratios of acute angles using calculators e) apply trigonometric ratios to calculate lengths and angles of right angled triangles in different situations. f) appreciate use of trigonometric ratios in real life situations.	The learner is guided to: ● draw right angled triangles and recognize angles and sides. Discuss the relationship between angles and sides. ● discuss and relate the trigonometric ratios to angles in a right angled triangle. ● use trigonometric ratios to determine lengths and angles of right angled triangles ● use Mathematical tables or IT devices to find trigonometric ratios of given angles.	What is the relationship between angles and sides in a right angled triangle?
Core competencies to be developed: ● Critical thinking and problem solving - as learners relate the trigonometric ratios to angles in a right angled triangle. ● Digital literacy - as learners use tables or calculators to find trigonometric ratios of given angles.				

Values: Responsibility - as learners take care of digital devices, mathematical tables and drawing materials.
Pertinent and Contemporary Issues: Safety - As learners plug and use digital devices
Link to other subjects: Pre-Technical Studies as learners draw right angled triangles and recognize angles and sides.

Assessment Rubric

Level / Indicators	Exceeds Expectation	Meets Expectation	Approaches Expectation	Below Expectation
Ability to draw a straight line graph given an equation, parallel and perpendicular lines	Draws a straight line graph given an equation and parallel and perpendicular lines accurately and precisely	Draws a straight line graph given an equation, parallel and perpendicular lines accurately	Draws a straight line graph given an equation, parallel or perpendicular lines accurately	Draws a straight line graph given an equation accurately
Ability to relate the gradients of parallel and perpendicular lines.	Relates the gradients of parallel and perpendicular lines correctly and Comprehensively.	Relates the gradients of parallel and perpendicular lines correctly	Relates the gradients of parallel or perpendicular lines correctly	Relates the gradients of parallel lines correctly
Determining the bearing of one point from another.	Determines the bearing of one point from another correctly and proficiently.	Determines the bearing of one point from another correctly	Determines the bearing of one point from another partially correctly	Determines the bearing of one point from another with continuous support

Determining angles of elevation and depression.	Determines angles of elevation and depression accurately and systematically.	Determines angles of elevation and depression accurately	Determines angles of elevation and depression accurately	Determines angles of elevation and depression accurately
Applying scale drawing in simple surveying.	Applies scale drawing in simple surveying accurately and appropriately	Applies scale drawing in simple surveying accurately	Applies scale drawing in simple surveying partially accurately	Applies scale drawing in simple surveying with continuous support
Ability to identify Angles and sides of right angled triangles.	Precisely Identifies angles and sides of right angled triangles.	Identifies angles and sides of right angled triangles.	Partially identifies angles and sides of right angled triangles.	Identifies angles and sides of right angled triangles with difficulties.
Ability to determine properties of enlargement and draw similar figures.	Determines properties of enlargement and draw similar figures accurately and consistently.	Determines properties of enlargement and draw similar figures accurately	Determines properties of enlargement or draw similar figures accurately	Determines properties of enlargement accurately
Ability to determine the linear scale factor of similar figures.	Determines the linear scale factor of similar figures accurately and systematically.	Determines the linear scale factor of similar figures accurately	Determines the linear scale factor of similar figures partially accurately	Determines the linear scale factor of similar figures with continuous support
Ability to identify Sine, Cosine and Tangent ratios from a right angled triangle.	Identifies Sine, Cosine and Tangent ratios from a right angled triangle accurately and consistently.	Identifies Sine, Cosine and Tangent ratios from a right angled triangle accurately.	Identifies Sine, Cosine or Tangent ratios from a right angled triangle accurately	Identifies any one of; Sine, Cosine and Tangent ratios from a right angled triangle accurately.

Ability to read tables of trigonometric ratios.	Reads tables of trigonometric ratios accurately and comprehensively.	Reads tables of trigonometric ratios accurately.	Reads tables of trigonometric ratios partially accurately.	Reads tables of trigonometric ratios with assistance.
Ability to determine trigonometric ratios of acute angles using calculators	Determines trigonometric ratios of acute angles using calculators accurately and consistently	Determines trigonometric ratios of acute angles using calculators accurately	Determines trigonometric ratios of acute angles using calculators partially accurately	Determines trigonometric ratios of acute angles using calculators with continuous support
Ability to apply trigonometric ratios to calculate lengths and angles of right angled triangles.	Applies trigonometric ratios to calculate lengths and angles of right angled triangles accurately and systematically	Applies trigonometric ratios to calculate lengths and angles of right angled triangles accurately	Applies trigonometric ratios to calculate lengths or angles of right angled triangles.	Applies trigonometric ratios to calculate lengths accurately

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 Interpretation (Grouped Data)** (8 lessons)	By the end of the sub- strand, the learner should be able to; a) determine appropriate class width for grouping data. b) draw frequency distribution tables of grouped data c) identify the modal class of grouped data. d) calculate the mean of a grouped data from real life situations. e) determine the median of a grouped data from real life situations. f) appreciate data interpretation in real life situations.	The learner is guided to: ● collect data and work out an appropriate class width. ● tally the data and represent it in a frequency distribution table. ● recognize the modal class from a set of grouped data. ● work out the mean from different sets of grouped data. ● use the frequencies to determine the median class of grouped data. ● work out the median from different sets of grouped data. ● use IT or other materials to determine the mean and median of grouped data.	How do we interpret data?
Core competencies to be developed: ● Learning to learn - as learners collect, organize and interpret data.				

● Critical thinking and problem solving - as learners discuss and determine the modal class, mean and median of grouped data. ● Digital literacy - as learners use IT or other materials to determine the mean and median of grouped data.
Values: ● Respect - as learners work together in groups to collect data from the immediate environment.
Pertinent and Contemporary Issues: ● Citizenship - as learners collect data that may relate to the population.
Link to other subjects: ● Integrated science - as the learners interpret data related to different organisms and materials. ● **L**earners relate analyzing and interpreting data in different social aspects in Social Studies.

Strand	Sub-strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
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) perform experiments involving equally and likely outcomes in different situations. b) determine the range of probability of an event. c) identify mutually exclusive events in real life situations. d) perform experiments of single chance involving mutually exclusive events e) perform experiments involving independent events in different situations. f) draw a tree diagram for a single outcome g) appreciate the probability of events occurring in real life situations.	The learner is guided to; ● discuss and carry out experiments of events involving equally and likely outcomes. ● work out the range of probability of different events. ● discuss and carry out experiments involving mutually inclusive events. ● discuss and carry out experiments involving independent events. ● practice representing probability occurrences in a tree diagram. ● use IT or other resources to explore more on probability.	Why is probability important in real life situations?

Core Competencies to be developed: ● Communication and collaboration - as learners discuss and carry out experiments of events involving equally likely outcomes. ● Critical thinking and problem solving - as learners carry out experiments involving mutually inclusive events. ● Self- efficacy -as learners carry out experiments involving independent events and avoid harmful practices of gambling.
Values: ● Responsibility - as learners discuss and carry out experiments involving mutually inclusive events ● Social cohesion - as learners work in groups and practice representing probability occurrences in a tree diagram.
Pertinent and Contemporary Issues: Financial Literacy - as learners carry out experiments involving independent events and avoid harmful practices of gambling using money
Link to other subjects: Learners work in groups to explore the weather patterns as they have learnt how it affects Agriculture.

Assessment Rubric

Level / Indicators	**Exceeds Expectation**	**Meets Expectation**	**Approaches Expectation**	**Below Expectation**
Ability to determine appropriate width and draw frequency distribution tables for grouping data.	Determines appropriate width and draw frequency distribution tables for grouping data accurately and systematically.	Determines appropriate width and draw frequency distribution tables for grouping data accurately	Determines appropriate width or draw frequency distribution tables for grouping data accurately	Determines appropriate width for grouping data accurately

Ability to determine the modal class, mean and the median of grouped data.	Determines the modal class, mean and the median of grouped data accurately and systematically	Determines the modal class, mean and the median of grouped data accurately	Determines the modal class, mean or the median of grouped data accurately	Determines the modal class or mean of grouped data accurately
Ability to perform experiments involving equally likely outcomes.	Performs experiments involving equally likely outcomes accurately and Systematically.	Performs experiments involving equally likely outcomes accurately.	performs experiments involving equally likely outcomes Partially accurately.	Performs experiments involving equally likely outcomes with support.
Ability to determine the range of probability of an event.	Proficiently Determines the range of probability of an event.	Determines the range of probability of an event.	determines the range of probability of an event Partially accurately	Determines the range of probability of an event with difficulties.
Ability to identify mutually exclusive events.	Identifies mutually exclusive events accurately and Proficiently.	Identifies mutually exclusive events accurately.	Identifies mutually exclusive events Partially accurately.	Identifies mutually exclusive events with support.
Ability to perform experiments of single chance involving mutually exclusive events.	Performs experiments of single chance involving mutually exclusive events correctly and Systematically	Performs experiments of single chance involving mutually exclusive events correctly.	Performs experiments of single chance involving mutually exclusive events Partially correctly.	Performs experiments of single chance involving mutually exclusive events with support.
Ability to perform experiments involving independent events.	Performs experiments involving independent	Performs experiments involving independent events accurately	Performs experiments involving independent	Performs experiments involving independent events with support.

	events accurately and Proficiently.		events partially accurately.	
Ability to draw a tree diagram for a single outcome.	Draws a tree diagram for a single outcome correctly and precisely.	Draws a tree diagram for a single outcome correctly.	Draws a tree diagram for a single outcome partially correctly	Draws a tree diagram for a single outcome with support.

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 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 Social Studies 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 exploit 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 society, research and brainstorm on 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.

i) **Life Skills:** Learners will develop life skills in the areas of decision making, assertiveness, effective communication, and problem solving and stress management.

ii) **Community Development:** Learners will be sensitized with 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)**
	By the end of the CSL project, the learner should be able to: a) identify a problem in the community through research 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	The learner is guided to: ● brainstorm on pertinent and contemporary issues in their community that need attention in groups ● choose a PCI that needs immediate attention and explain why in groups ● carry out research using digital devices print media/interactions with members of the community/resource persons in identifying a community problem to address in groups ● discuss possible solutions to the identified issue in groups ● propose the most appropriate solution to the problem in groups	1. How does one determine a community need? 2. Why is it necessary to make adequate preparations before embarking on a project?

	f) appreciate the need to belong to a community.	● 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) ● 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) conclude, reflect, report 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: Learner develops the skills of self-awareness and leadership as they undertake the CSL project
- Creativity and Imagination: Learner 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: Learner can use technology when as they research on a community problem that they can address.

- Learning to Learn: Learner gains new knowledge and skills as they identify a community problem to be addressed and make preparations to carry out the project.
- Citizenship: This is enhanced as learner chooses a PCI that needs immediate attention in the community.

Pertinent and contemporary Issues

- Social cohesion as learner discusses possible solutions to the identified issue.
- Critical thinking as learner discusses possible solutions to the identified issue.

Values

- Integrity as 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

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 identifies a problem in the community	Only with prompts identifies a problem in the community
Ability to design solutions to the identified problem	Elaborately designs solutions to the identified problem	Designs solutions to the identified problem	Fairly designs solutions to the identified problem	With assistance designs solutions to the identified problem
Ability to plan to solve the identified problem	Thoroughly plans to solve the identified problem	Plans to solve the identified problem	Fairly plans to solve the identified problem	With assistance plans to solve the identified problem

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 implements the plan to solve the problem	With assistance implements the plan to solve the problem
Ability to report on the concluded project	Exhaustively reports on the concluded project	Reports on the concluded project	Partially reports on the concluded project	With assistance reports on the concluded project

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

Strand	**Sub-strand**	**Suggested Assessment Methods**	**Suggested Learning Resources**	**Suggested Non-Formal Activities**
Numbers	Integers	● Class activities ● Class written tests ● Home or extended assignments or activities. ● 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 ● Home or extended assignments or activities.	Mathematical tables Calculators.	

Strand	Sub-strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal 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 organizing 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	

Strand	Sub-strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal Activities
Measurement	Area	● Class written tests ● Home or extended assignments or activities.	Square cut outs, squares, writing materials	
	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	
	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.

Strand	Sub-strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal Activities
	Approximation and errors	● Class activities ● Home or extended assignments or activities.	Rulers, digital clocks	
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 ● Home or extended assignments or activities ● project	Similar containers, objects of different sizes	Collect similar containers from the immediate environment including home, discuss how they are used especially in packaging different quantities. Discuss how packaging can be used to protect consumers.

Strand	Sub-strand	Suggested Assessment Methods	Suggested Learning Resources	Suggested Non-Formal Activities
	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 2: USE OF ICT TOOLS

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

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