THE REPUBLIC OF UGANDA
Ministry of Education and Sports

SECONDARY SCHOOL
ABRIDGED CURRICULUM
FOR UGANDA

- MATHEMATICS
- PHYSICS
- BIOLOGY
- CHEMISTRY
- AGRICULTURE

SENIOR 3

NCDC
NATIONAL CURRICULUM DEVELOPMENT CENTRE

SECONDARY SCHOOL
ABRIDGED CURRICULUM
FOR UGANDA

MATHEMATICS
PHYSICS
BIOLOGY
CHEMISTRY
AGRICULTURE

SENIOR 3

A product of the National Curriculum Development Centre for the Ministry of Education and Sports with support from the Government of Uganda

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P.O. Box 7002,
Kampala- Uganda
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ISBN:

Content

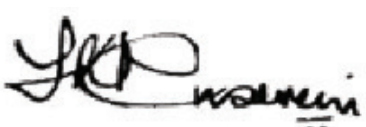
Foreword

The COVID-19 pandemic caused a disruption in our education system and made learners miss schooling for almost 18 months of the 2020-2021 schooling period. This has created a need to re-think what and how learners will learn when schools re-open.

The Ministry of Education and Sports through National Curriculum Development Centre (NCDC), has developed this abridged curriculum for Primary and Secondary schools in the country. This curriculum presents a selection of priority learning competences and concepts, along with psychosocial support, which should be the focus of instruction in the 2022 school year in order to achieve learning recovery.

This curriculum is not a departure from the existing curricula for the different classes but rather, a modification of the same with a purpose of recovering the lost learning time with minimum learning loss. It has been packaged for all Primary and Secondary classes with exception of Primary One, Senior One and Senior Five that will use the standard curriculum.

I therefore, recommend this abridged curriculum and ask all stakeholders to support its implementation as a strategic intervention towards the mitigation of the effects of COVID-19 pandemic on our education system. The effective implementation of this curriculum by the implementers will be a great milestone towards the recovery of lost learning time and giving hope and confidence to learners and teachers.



Hon. Janet K. Museveni
First Lady and Minister for Education and Sports

Acknowledgement

National Curriculum Development Centre (NCDC) would like to express its most sincere appreciation to all those who worked tirelessly towards the development of the abridged curriculum for Primary and Secondary levels of education.

The Centre is indebted to the NCDC Governing Council and the Academic Steering Board whose guidance and input helped to develop quality curriculum materials.

Great thanks go to the Specialists, panel members, the Quality Assurance and Editorial Committees that invested heavily in the conceptualisation, development and quality assurance processes that collectively delivered the materials that we have here. Their efforts, extra energy and professionalism has been unmatched.

This abridged curriculum was developed with support from The Government of the Republic of Uganda, Save the Children, UNESCO, Uganda National Examinations Board (UNEB), Directorate of Education Standards (DES), Universities, National Teachers Colleges (NTCs) and Primary Teachers Colleges (PTCs).

NCDC takes responsibility for any shortcomings that might be identified in this publication and welcomes suggestions for addressing the gaps. Such comments and suggestions may be communicated to NCDC through P.O. Box 7002 Kampala or email admin@ncdc.go.ug or www.ncdc.go.ug.

Dr Grace K. Baguma
DIRECTOR,
NATIONAL CURRICULUM DEVELOPMENT CENTRE

MATHEMATICS

Introduction

The content for senior two and senior three has been merged to come up with an abridged curriculum for senior three. The table below shows the guidance given to the teacher on which content has been deleted and which content has been merged.

SN	CRITICAL CHANGES	JUSTIFICATION
1.	Mappings and Relations The following outcome has been removed • Draw papygram	The arrow diagram is sufficient to describe a relation. Therefore, the papygram has been deleted.
2.	NUMERICAL CONCEPTS The following learning outcome has been deleted • Define and identify rational numbers and work out problems involving rational numbers. • Convert recurring decimals into fractions The following have been combined • Numerical concepts, indices and logarithms standard form, computation, and surds	Content has already been taught in senior one. In senior 2 it is revision. The three topics are closely linked, so they can be combined
3.	BUSINESS ARITHMETIC i. Calculate profit and loss. ii. Express profit and loss as	Already studied in senior one under commercial and household arithmetic

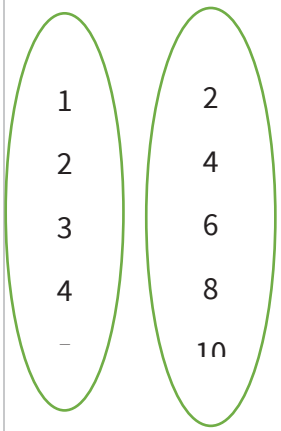
	percentage. iii. Calculate discount and commission.	
4.	Geometry In geometry three topics have been merged and these include; geometry, length and area (formerly in senior two) geometry nets and solids (formerly in senior two), areas and volumes of solids. The following learning has been removed • Calculate areas of two - dimensional figures	The concepts of the three topics are linked therefore, these can be merged and taught together. This is learnt in Primary
5	Set theory This content has been deleted	This content has been learnt in senior one
6	GRAPHS This topic has been deleted.	Some learning outcomes have been merged with the topic on equation of a straight line.
7	Algebraic expressions, equations and inequalities Two topics were combined and that is algebraic equations and equations and inequalities	The topics are related and linked The content is linked to the topic This content has been learnt in primary and senior one

	Factorise and expand algebraic expression has been included in this topic. Building formulae as a learning outcome has been deleted	
8	Ratios and Proportions The following learning outcomes have been removed; • Describe quantities in ratios • Change quantities in a given ratio • Describe proportion In this topic there was a merger with proportion of senior 3	The content has been learnt in primary school. However, the teacher can recap. Content is linked.
9	Business Mathematics The following learning outcomes have been removed • Calculate profit and loss • Express profit and loss as a percentage • Calculate discount and commission	The content is covered in primary and senior one.

TOPIC 1. MAPPINGS AND RELATIONS

<table>
<tr><th>COMPETENCIES

The Learner should be able to;</th><th>KEY CONCEPTS</th><th>TEACHING/LEARNING ACTIVITIES</th><th>ASSESSMENT STRATEGY</th></tr>
<tr>
<td>i) Describe a mapping and a relation
ii) Draw arrow diagrams
iii) Identify domain and range mapping
Distinguish between a function and non-function mapping</td>
<td>Theoretical understanding and application of;
• Ordered pairs
• Mapping
• Relation, arrow diagram
• Domain
• range
• Function
• Non-function</td>
<td>Learners to write ordered pairs out of this activity.
i) Group the following objects in such a way that they have common property/ characteristics.
ii) Describe the relation of an object to its common name.
Fork, liquid eraser, grater, pencil, knife, ipod, laptop, ball pen, pot, digital camera, tablet, cell phone, ladle, notebook, paper
<table>
<tr><td>Kitchen utensils</td><td>School supplies</td><td>gadgets</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
</td>
<td>Observe the learners in their groups as they carry the activity below. Find out the learners' attitude towards the group work, integrity, are they doing the work in harmony?
During the process of the description, are learners communicating effectively? Are they learning from one another? Are they creative and critical?
Let the learners give their group reports.
Activity: Describe the mapping diagram below by writing the set of</td>
</tr>
</table>

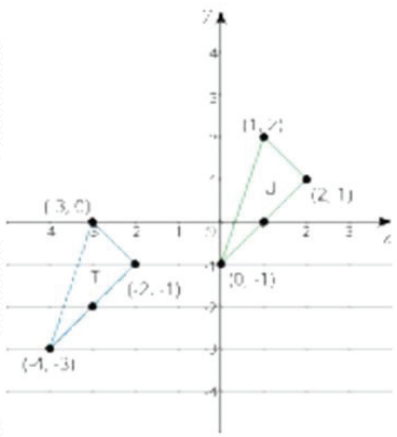
			ordered pairs  1) How did you make a set of ordered pairs? 2) How many elements are there in the set of ordered pairs you have made? 3) 3.What elements belong to the first set? Second set? 4) 4. Is there a repetition on the first coordinates? 5. How about the second coordinates?

TOPIC 2. NUMERICAL CONCEPTS

Identify real numbers. iii.Identify base number and index. iv.State and apply the laws of indices. v.Express numbers in standard form. vi.Express nth root of an integer index form	Numerical concepts develop the skills of Computations and identification of: • Real numbers • Base number • Power/index • Laws of indices • Standard form of large and small numbers • Simplify indices • Negative indices • Fractional indices	In groups, learners identify rational numbers and irrational numbers from sets provided and they justify why in their discussions.	1.Task learners to convert a variety of recurring decimals into fractions. 2. The population census of 1969 found that the population of Uganda was 9,500,000. The population census of 2011 found that it was 32,900,000. Tushabe said, "The population rose by 23,400,000." Mariam said, "The population rose by 2.34×10^7." Who was correct? Justify your answer.

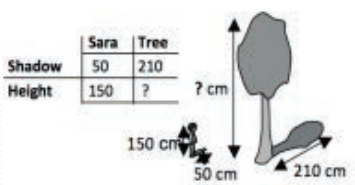
TOPIC 3. VECTORS AND TRANSLATION 1

i. Describe translation ii. Identify scalars and vectors iii. Use	• Translation vector • Scalar • Position vector • Addition and	In groups, study and perform the following instructions : a) From	In groups, let the learners discuss the following activity. Observe them as they discuss the activity. Assess the learners on the core

vector notation iv. Represent vectors both single and combined geometrically v. Apply vectors in real life situations	Subtraction of vectors.	your classroom move 500m towards the Head teacher's Office b) From your classroom move 500m Do the above two statements mean the same? Discuss their difference(s)	values and generic skills. The learners should write reports and present them to the Class. • What is the vector that translates T to J? • What is the vector that translates J to T? 

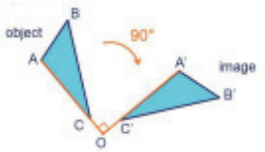
TOPIC 4. SIMILARITY AND ENLARGEMENT

i. Identify similar figures ii. State and use the properties of similar figures	• properties for similar figures • Relate ratio to linear scale factor • Relate	• Place an object in front of a lamp. What happens to the size of the shadow as the object	• Observe the learners in their groups as they discuss the tasks below. During the process, are learners communicating • Effectively? Are they learning from one

ii. Describe enlargement v. Use the properties of enlargement to construct objects and images. v. State the relationship between linear, area and volume scale factors. Apply scale factors in real life situation.	L.S.F to enlargement • Center of enlargement • Properties of enlargement through construction of object and image • Relate L.S.F to A.S.F and V.S.F • Application of similarity and enlargement to real life situation. • Congruency	moves closer to and further from the lamp? • Explore enlarging shapes through different centres of enlargement with different scale factors. What happens to the area of the shapes?	another?, Are they creative and critical? • Bayo and Sara want to find the height of a tree. They cannot climb the tree. Instead, they measure Sara's own height, the length of Sara's shadow, and the length of the tree's shadow. The table shows their results.  What is the height of the tree? Give your answer to a reasonable degree of accuracy.

TOPIC 5. ROTATION

i).State the order of rotational symmetry of plane figures ii). Tell the difference between clockwise and anti-clock wise rotation iii).State properties of rotation as a transformation iv).Determine the centre and angle of rotation v).Apply properties of rotation in the Cartesian plan. vi).Deduce congruence from rotation.	• Orders of rotation – rotational symmetry. • Centre of rotation. • Angle of rotation. • Finding the centre by drawing when object and image are given.	1.Use pins or compasses and graph paper. Start with angles of a whole circle (360°) then half circle and then quarter – circle. Proceed to other angles very gradually. Look for invariances Compare with reflections, translations and enlargement. 2. Are there any capital letters of the alphabet that have rotational symmetry? 3. Cut shapes from scrap card, draw around the shape on a plain sheet of paper to create the object. Rotate the card shape about an identified centre of rotation (O) through an angle, and in a given direction (clockwise or anticlockwise). Draw around the card to	• Plot the points P (-2, 1), Q (0, 2) and R (1, 2) to form the triangle PQR on a square grid. Rotate PQR about the point (0, 0) through an angle of 90° clockwise. What are the Coordinates of the image of triangle PQR after the rotation? • Determine the centre of rotation and the angle of rotation 

		create the image  4. Investigate rotating different shapes on plain paper and a coordinate grid. 5. Given an object and image. construct the centre of rotation.	

TOPIC 6. GEOMETRY

i) State Pythagoras theorem ii) Solve problems using Pythagoras. iii) Identify and sketch common solids iv) Form nets and solids v) Calculate surface areas of three-dimensional	• Pythagoras theorem • Properties of two-dimensional figures. • Relate two and three dimensional figures. • Use nets to differentiate between two dimension or three-	Cut a triangle from a piece of scrap paper – fold to show how the area of a triangle is related to the area of a rectangle In groups, learners construct cubes, cones, cuboids and pyramids using local	• Observe the learners in their groups as they carry the tasks below. During the process, are learners communicating effectively? are they learning from one another? are they creative and critical? A square storeroom has sides of length 2 metres and a door near one corner. What is the

figures vi) Calculate the volume of some figures (e.g. cubes and pyramid)	dimensional figures. • Areas and Volumes of Solids develop skills	materials and measure their dimensions	length of the longest pole that can be stored safely, resting on the floor of the room? Task learners to calculate the volumes of the figures that they have constructed and then express them in different units. Observe how they co-operate

TERM II

TOPIC 7. THE EQUATION OF A STRAIGHT LINE

i. State and use the gradients of a line to find the equation of the line ii. Determine the equation of a straight line using the x and y-intercepts iii. Apply the relationship of gradients of parallel and perpendicular lines to get the equation of a straight line iv. Determine the equation when a line is given on the graph	•Gradient of a line. •Equation of a line given – Gradient and y – intercept given two points. •Equation of perpendicular and parallel lines	a) Place the foot of the ladder at i) 6m, ii) 5m, iii) 2m from the wall and lean the ladder against the wall b) What happens to the angle between the ground and the ladder as the foot of the ladder moves closer to the wall? c) Relate the steepness of the ladder with the distance between the wall and the foot of the ladder. Explain this relationship. • Recall Senior 1, Topic 11: how does the equation y=mx + c work? • Introduce gradient as a measure of steepness/rate of change	Observe the learners in their groups as they carry out the tasks below. During the process, are learners communicating effectively? Are they learning from one another? Are they creative? 1. Asabi is going to plot the graphs of these six equations: y=2x+1, y=3x, y=x+4 2. Y=+x=6, y=2x-5, 2y=3-x Without plotting the equations: Which graph will be steepest? Which will have the greatest y-

		• Draw a straight line and a perpendicular line on a coordinate grid. What are their equations? Try for another pair. What do you notice about the gradients? • Investigate the least number of points that need to be plotted to draw a straight line.	intercept? Are any of the lines parallel or perpendicular? Explain your answer. Sendi drew the graphs of 2x-3=y and y=7 on the same set of axes. What are the coordinates of intersection?

TOPIC 8. SIMULTANEOUS EQUATIONS

i. Solve simultaneous equations using substitution and elimination ii. Draw graphs of simultaneous equations and find the solution	•This topic develops the skills of solving various unknowns simultaneously	Maureen buys 3 tins of peanut butter and 5 tins of margarine for UGX 32 000. Zulaika buys 6 tins of peanut butter and 8 tins of margarine for UGX 59 000. Musisi buys one tin of peanut	• Solve the following pairs of simultaneous equations using elimination method. • (a) 7x + 3y = 32 3x + 12y = 78 (b) 6y + 14 = 7x 5x – 12 = 4y 2. Use substitution to solve the

iii. State the difference between linear equation and quadratic equation iv. Draw the graph of the line and the curve and solve the two equations from the graph		butter and one tin of margarine. How much does he pay? • How does the set of equations 3x+5y=32 and 6x+8y=59, relate to the problem above?	simultaneous equations: 3x + y = -2 4x + 2y = 0

TOPIC 9. INEQUALITIES AND REGIONS

i. Identify and use inequality symbols ii. Illustrate inequalities on the number lines iii. Solve the linear inequalities in one unknown iv. Represent the	• Developing skills of decision making • Use of inequality symbols • Identifying the regions	In pairs, measure the height of each member. Each pair presents its heights to the rest of the class. Find out	Observe the learners in their groups as they carry out the activity below. Find out the learners' attitude towards the group work, integrity, are they doing the work in harmony? During the process of the description, are

linear inequalities graphically v. Form simple linear inequalities from inequality graphs Find the required region		who is a) Taller b) Shorter, in each pair? c) Identify the tallest or shortest learner in your class	learners communicating effectively? are they learning from one another? are they creative and critical? Let the learners give their group reports Activity1: The area of a circle is less than 750cm^2 but greater than or equal to 250cm^2. Find the inequality that the radius, r, must satisfy.

TOPIC 10. ALGEBRAIC – EXPRESSIONS, EQUATIONS AND INEQUALITIES

i. Re-write a given formula by changing the subject ii. Expand and factorise algebraic expressions .	• Algebra develops skills of using and determining the unknowns and use them in real life situations. • solving for	Bayo, Ruth and John were all born on Independence Day, but in different years. Bayo is one year older than Ruth. John's age is 3 times Bayo'sage. If Ruth is r years old, write down	• Observe the learners in their groups as they discuss the tasks below. During the process of the presentation, are learners communicating effectively?, are they learning from one another?, are they creative and critical?

	unkowns	expressions for: (a) Bayo's age (b) John's age (c) How many years older than Bayo is John? Give your answer in terms of r (d) In 6 years' time, John will be 6 years older than Bayo. How old is Ruth now?	• Alupo thinks of a number. She carries out two calculations on the number. First, she adds 5. Then she multiplies the sum by 3. Her result is 27. What was Alupo's original number?

TOPIC 11. QUADRATIC EQUATIONS

i. Solve quadratic equations using factorization, completing square and formula ii. Make tables of values from a quadratic equation using graphs iii. Solve quadratic equations using graphs Form and solve quadratic equations from roots and given situations	• Factorization • Completing squares • Formulae • Skills of drawing	A rectangular garden with an area of 1000m^2. Its length is 30m greater than its width. Find the dimensions of the garden	Observe the learners in their groups as they work out the exercise below. Find out the learners' attitude towards the group work, integrity, are they doing the work in harmony? During the process of the presentation, are learners communicating effectively? are they learning from one another? are they creative and critical? Let the learners give their group reports 1. A room p metres long and (p- 3) metres wide has an area of 40m^2. Obtain an equation in p. Determine the value of p 2. Try to solve $x^2 - 3x + 4 = 0$ by:

			i) factors ii) completing the square iii) formula For each method, state briefly the difficulty you encountered.

TOPIC 12. CIRCLE PROPERTIES

i. Relate angles made by an arc at the circumference and centre ii. State the angle in the semi-circle iii. State the properties of a cyclic quadrilateral iv. Find the length of the common chord	• This develops skills of understanding the Circle properties	Collect a number of circular objects of different diameters, such as bottle tops, plates, drums, etc. For each object: a) Measure the diameter with a ruler; measure the circumference with string; demonstrate with the string how many times greater the Circumference is than the diameter. b) Halve your value of the diameter to	Observe the learners in their groups as they work out the activity below. Find out the learners' attitude towards the group work, integrity, are they doing the work in harmony? During the process of the presentation, are learners communicating effectively? Are they learning from one another? Are they creative and critical? Let the learners hand in their group

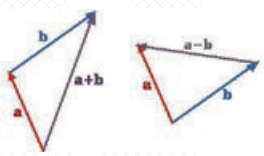
Calculate area of sector and segment		find the radius. Use the relationship between the circumference, diameter and radius to estimate the area of the circular objects you collected. Trace around the circle and use a square grid to check your estimate	reports The Wheels of a Bicycle have a diameter of 70cm. Taking π = 22/7, find the distance travelled by the Bicycle when the Wheels turn through 300^0

TERM III

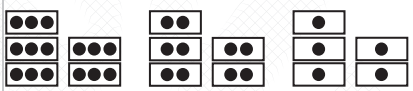
TOPIC 13. SINE, COSINE AND TANGENT

i. Define sine, cosine and tangent ratios from right angled triangles ii. Read and use tables and calculators to find trigonometrical ratios Use sine, cosine and tangent in calculating lengths of sides and angles of triangles.	•Develops skills of determining the sides of Triangles. • Taking readings from tables and calculators.	•Practice on reading tables or calculator to obtain the trigonometric ratios for different angles •Ratios for special angles	• The hour and minute hands of a clock have lengths of 44mm and 57mm respectively. (a) Calculate the distance between the ends of the hands when the angle between the hands is 69°. (b) Calculate the angle between the hands when the ends of the hands are 32mm apart. • A pole 8.3 metres long and a pole 11.5 metres long are placed on the ground with two ends in contact with each other. The distance between the other two ends is 4.7 metres. Find the angle between the two poles at the point of contact.

TOPIC 14. VECTORS

(i) Define position vector geometrically and as a column vector. (ii) Find the vector of a directed line segment when position vectors of the end points are known. (iii) Find the position vector of the mid-point of the line segment. (iv) Use vector method in dividing a line proportionately internally and externally (v) Use vector to show parallelism (vi) Use vector methods to show collinearity	• Position vectors as journeys of the same vector from the origin. • Operations on vectors Extension to subtraction using the additive inverse. • Midpoint of a vector. • Extension to division of vectors in simple ratios.	Recall and review Senior 2, Topic 2, what is the difference between a vector and scalar quantity? Give examples. • Identify parallel and equal vectors. • Use vector addition and subtraction  • Explore the use of position vectors to define positions on a coordinate grid, including the midpoint of a line segment and proportional division of a line. • How can vectors be used to test for collinearity?	Observe the learners in their groups as they carry out the tasks below. During the process, are learners communicating effectively? are they learning from one another? are they creative and critical? • Which of the following vectors are parallel? $\begin{pmatrix}1\\2\end{pmatrix}, \begin{pmatrix}2\\1\end{pmatrix}, \begin{pmatrix}2\\3\end{pmatrix}, \begin{pmatrix}-2\\-4\end{pmatrix}, \begin{pmatrix}8\\16\end{pmatrix}$ Explain your answer. • Use vectors to find the midpoint of the line segment AB where A is (1, 7) and B is (-3,-3). The point (1, 1) divides the line segment AB internally in the ratio 3:4. A is (-2, 7). Use vector methods to find the coordinates of B. • Use vectors to establish whether the points (5, 2), (-3, 6) and (9, 4) are collinear

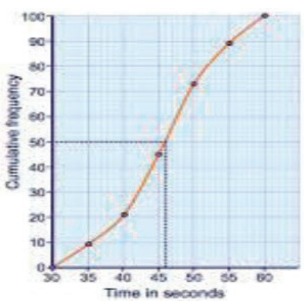
TOPIC 15. RATIO AND PROPOTION

i)Differentiate between direct and inverse proportions ii)Interpret the given scales iii)State Joint and partial variations. iv)Apply joint and partial variations in solving problems v)Using Compound proportion to solve real life problems	•Conventional way of writing ratios •Meaning of a ratio and its practical application to real life situations •Relate ratios to fractions and percentage •Relate ratio to proportions •Meaning of Direct proportion •Use graph to explain the meaning of direct proportion •Meaning of Inverse proportion •Use graph to bring out the meaning of direct	Draw diagrams to show some ratios that are equivalent to 5:3 c) Simon says, "12:15 is equivalent to 3:4".Is he correct? Draw diagrams to justify your answer. Adjust recipes e.g. 8 cakes need 400 grams of flour. How much flour for 20 cakes? How many cakes with 750 grams of flour? These are examples of direct proportion,  9:6 = 6: ___ = ___:2 Look at the diagrams. a) Use the diagrams to fill in the gaps and complete the equivalent ratios. b) Draw diagrams to show some ratios that are equivalent to 5:3 c)Simon says, "12:15 is equivalent to 3:4". Is he correct? Draw diagrams to justify your answer.	•Observe the learners in their groups as they carry out the tasks below. During the process, are learners communicating effectively? are they learning from one another?, are they creative and critical? •Mrs. Mukasa is a small-scale poultry farmer. It costs her UGX.250 000 to buy the feed to raise 70 broilers. • a)Mrs Mugisha wants to raise 300 broilers. How much will the feed needed to raise these broilers cost? •Day old broiler chicks cost

	proportion • proportion develops the value of sharing equitably		UGX. 2000 each. Mrs Opio has UGX. 1 000 000 (one million shillings). She wants to buy and raise as many chicks as she can. How many should she buy? In a technology and Enterprise lesson, learners had a recipe to make small cakes. 8 cakes needed 400 grams of flour. a) Hadijah wants to make 20 of the cakes. How much flour does she need? b) Denis has 750 grams of flour. How many of the cakes can he make? Mrs. Mukasa is a small-scale

			poultry farmer. It costs her UGX. 250,000 to buy The feed to raise 70 broilers.

TOPIC 16. STATISTICS (MODE, MEAN AND MEDIAN)

(i)Draw frequency tables for grouped data. (ii) Calculate mean using assumed mean (iii) Calculate mode and median. (iv) Draw a histogram and use it to estimate mode. (v) Form cumulative frequency distribution	•A critical look at the ways in which data is collected and displayed in particular situations and examination of conclusion arrived at objectively (include Frequency polygons and histograms) •Frequency tables for ungrouped	• Class to get in height order – stand in a circle to illustrate the range (difference between tallest and shortest person). Discuss representative/typical values – find the most popular height (mode), the middle height (median), what if we were all the same height? (The mean). • Compare the advantages and disadvantages of mean, median and mode in different contexts. Explore the need for	The cumulative frequency diagram shows the time taken by 100 people to complete 10 press-ups. Find an estimate for the median time. Explain why only an estimate for the median is possible 

table, construct, give and use it to estimate the median.	data . •Grouped frequency tables. •The mean using mid – intervals, assumed mean method •The median value from a group of values, mode from grouped data. •Graphical presentation	grouping data when there are many different values. Once grouped exact statistics (mean, median, mode, range) cannot be determined. Compare estimates from grouped data with the actual values from the raw data.	

TOPIC 17. BUSINESS MATHEMATICS

i.Calculate profit and loss ii.Express profit and loss as percentage iii.Calculate discount and commission	• Business Mathematics develops the skills of decision making in Business • Discounts • Commission	Explain the meaning of the following terms, buying, selling, profit, loss, commission, discount, interest, mortgage, currency, income tax, appreciation and	Observe the learners in their groups as they carry out the activities below. Find out the learners' attitude towards the

iv.Tell the difference between compound interest and simple interest. v.Calculate compound interest using step by step method. vi.Apply the compound interest formula for calculating interest. vii.Define and calculate hire purchase. viii.Tell advantages and disadvantages of hire purchase ix.Define Mortgage. x.Calculate income tax given income tax bands.	• Household Budgeting • Percentages-profit and loss • Simple interest • Compound interest • Hire purchase • income per head • taxable income •Pay as You Earn • other taxes, e.g. direct and indirect, local taxes, City Council, rates, mortgage	depreciation	group work, integrity, are they doing the work in harmony? During the process of the presentation, are learners communicating effectively? are they learning from one another? are they creative and critical? Let the learners give their group reports 1. A piece of sculpture and painting together cost sh (UGX.21 000. The painting costs twice as much as the piece of sculpture. Find the cost of the painting 2.The marked price of a set of

			curtains is UGX.75 000, but there is a cash discount of UGX.12.50 on every sh100. Find the cash price for the curtains. 3. If a forex bureau buys Kenya shilling at the rate of UGX 42 per Kenya shilling, find: (a) the amount in UGX paid out by the Bureau in exchange for K shillings 625. (b) the amount in Kenya shillings that can be exchanged or UGX. 5 460

TOPIC 18. MATRICES

i. Describe a matrix ii. State the order of a matrix iii. State types of matrices iv. Determine compatibility in addition and multiplication of matrices v. Find determinant of a 2 x 2 matrix vi. Find the inverse of a 2 x 2 matrix Use matrices to solve simultaneous equations	•Matrices as a store of Information. •types of matrices. •Order of matrices • Combination of matrices where addition is possible and meaningful • Scalar multiplication. • Matrix multiplication	(a) Visit your school store for food. (b) Arrange the food items found in the store in lines e.g. lines of sacks of beans, posh etc. (c) (i) What does each line represent (ii) State the number of horizontal and vertical lines you have formed	Observe the learners in their groups as they carry out the activity to find the order of the matrices below. Find out the learners' attitude towards the group work, integrity, are they doing the work in harmony. During the process of the presentation, are learners communicating effectively? are they learning from one another? are they creative and critical? Let the learners give their group reports Write down the orders and the

			types of the following matrices. I) $\begin{bmatrix} 2 & 1 & 5 \end{bmatrix}$ ii) $\begin{bmatrix} 3 \\ 4 \\ 2 \end{bmatrix}$ iii. $\begin{bmatrix} a & c \\ b & d \end{bmatrix}$

PHYSICS

Introduction

The abridged Physics Syllabus for Senior Three has been designed to address the learning gaps that were created as a result of the Covid 19 pandemic. It is hoped that you were able to cover the some aspects of Mechanics and General Physics during the little time you were at school. Critical content has been sorted and put together to be taught in a period of one year. The syllabus combines work which was not taught in Senior Two before the lock down and that for Senior Three, in a condensed way. In order to avoid repetition of related concepts, learning has been structured around the major thematic areas i.e Mechanics and General Physics, Light, Heat, Waves and Sound, and Electricity. It is hoped that the content areas included in this syllabus will enable the learner to acquire the target knowledge, understanding, skills and values for the progression in Physics.

The critical changes are highlighted in the matrix below.

SN	CRITICAL CHANGES	JUSTIFICATION
1	Introduction to electricity and magnetic effect of electric current, which were supposed to be carried forward from S.2 to S.3, were left out.	This was due to time constraints and the learners will meet similar content in S.4
2	Growing of crystals, Brownian motion, diffusion, oil film experiment and surface tension, which were supposed to be carried forward from S.2 to S.3, were left out.	This was due to time constraints and these topics do not form a basis for learners to progress with the topics selected for S.3
	The concepts of the ticker-tape timer and non-linear motion were left out	The concept of the ticker-tape timer does not form the basis for the learners to understand concepts in linear motion. On the other hand, learners will meet the concept of non-linear motion in future studies in Physics.
3	Fluid flow	This was left out due to time

SN	CRITICAL CHANGES	JUSTIFICATION
		constraints and the learners are bound to meet similar concepts in Advanced level
4	Electromagnetic spectrum under dispersion was moved to waves	This was because a related concept is covered in waves and has better coherence
5	Refraction and dispersion were combined	These have related concepts
6	Elasticity was not carried forward from S.2 to S.3	This was due to time constraints and this would not in any way affect the progress of the learners in Physics.
7	Properties of materials under stress, bending beams and effects of shape, and structures were left out	This was due to time constraints and they do not form the core of the concepts that the learners need for progress in the subject.
8	Expansion of solid and liquids was left out	This was due to time constraints and the learner is expected to have met related concepts in primary school.

DETAILED ABRIDGED PHYSICS SYLLABUS FOR SENIOR THREE

Topic/subtopic	Objectives	Key Concepts	Teaching /Learning Activities	Assessment Strategy
Term I				
TOPIC: Linear motion				
1. Speed and average speed 2. Velocity-time and displacement-time graphs for linear motion 3. Equations of motion	***The learner should be able to:*** a) Explain what is meant by displacement, speed and velocity. b) Calculate speed and average speed. c) Plot and/or interpret a displacement-time graph when a body is: at rest, moving with uniform velocity, or moving with non-uniform velocity and use it to calculate	Motion is a result of change of position with time as a result of force	i) In groups, learners demonstrate motion in the play field and how to measure speed and average speed. ii) Learners carry out an activity to determine acceleration due to gravity using a	a. Ask learners to sketch a velocity – time graph for given data. Asses the labelling of axes, the fitting of variables and the use of the

Topic/subtopic	Objectives	Key Concepts	Teaching /Learning Activities	Assessment Strategy
	velocity. d) Explain acceleration and apply the equations of motion to solve numerical problems. e) Plot and/or interpret a velocity-time graph and use it to determine displacement and acceleration. f) Experimentally determine acceleration due to gravity.		pendulum and compare their results to the quoted value.	graph to calculate total distance covered. b. Assess Learners on interpreting graphs of motion.
TOPIC: Momentum and Newton's laws of motion				
1. Linear momentum 2. Newton's laws of motion and their applications	***The learner should be able to:*** a) Explain the meaning	Momentum of a body	1) Learners carry out activities using different	• Task learners to solve

Topic/subtopic	Objectives	Key Concepts	Teaching /Learning Activities	Assessment Strategy
	of momentum. b) State the principle of conservation of momentum and its implications. c) Solve numerical problems related to the conservation of momentum. d) Describe situations where linear momentum is applied. e) State Newton's laws of motion and describe their implications/applications. f) Apply the relationship *resultant force = mass × acceleration*	depends on its mass and velocity All bodies obey Newton's laws in one way or the other Friction has an effect on the motion of a body.	masses to demonstrate the conservation of momentum. 2) In groups learners demonstrate the concept of Newton's first law and inertia using different masses. 3) Learners demonstrate the concept of action and reaction using spring balance.	numerical problems related to the conservation of momentum. Assess how they use the formulae • Let learners explain their feeling when they are sitting in a stationary vehicle

Topic/subtopic	Objectives	Key Concepts	Teaching /Learning Activities	Assessment Strategy
	to solve related numerical problems			that suddenly starts to move
Topic: Friction between solids				
1. Investigating the factors that affect friction 2. Reducing friction between solids 3. Applications of friction	a) Define friction. b) Carry out experiments to determine factors affecting static and dynamic friction. c) Give advantages, disadvantages and applications of friction. d) Describe methods of reducing or increasing friction.	Friction is a major occurrence in daily life and affects many of our daily activities	• Learners carry out investigations involving reduction or increase of friction.	• Assess learners on the concepts of friction such as investigating factors that affect friction and how to minimise it

Topic/subtopic	Objectives	Key Concepts	Teaching/Learning Activities	Assessment Strategy
Term II				
TOPIC: Refraction and Dispersion of light				
1. Refraction at a plane surface 2. Real and apparent depth 3. Total internal reflection and critical angle 4. Dispersion of white light 5. Colours	***The learner should be able to:*** a) Describe terminologies related to refraction at plane surfaces. b) Describe an experiment to demonstrate the laws of refraction and apply them to different situations (e.g.) effects of refraction, determining refractive index). c) Explain the terms *critical angle* and	Light changes speed and direction when it moves from one medium to another White light is made up of different colours.	i) Carry out activities to determine the refractive index of glass using a variety of methods ii) Carry out activities to show the splitting of white light and discuss what causes it iii) Observe objects of different colours through filters and discuss why	i. Ask learners to identify and observe the effects of refraction of light in everyday life. ii. Learners explain why some objects appear coloured and others black when viewed in different coloured lights.

	total internal reflection and their implications/applications. d) Explain dispersion of white light, its implications and application.		the objects appear that way	
TOPIC: Lenses and Optical Instruments				
1. Formation of images by lenses 2. Optical instruments (magnifying glass, human eye, lens camera and projector only)	***The learner should be able to:*** a. Describe the properties and action of lenses. b. Determine focal length of convex lens. c. Graphically construct images (on scale) formed by lenses using the standard rays. d. Describe	Lenses refract light to form images. This leads to various applications	i. Carry out activities to determine focal length of a convex lens, by estimation and accurate methods ii. Carry out activities to demonstrate applications of lenses	Ask learners to draw ray diagrams to image formation by a. a converging lens. b. a diverging lens when objects are at different positions

	applications of lenses.			
TOPIC: Waves and sound				
1. Production of waves 2. The wave equation $v = f\lambda$ 3. Reflection, refraction, diffraction and interference of waves 4. Transmission of sound waves 5. loudness, pitch and intensity, and factors affecting them 6. Electromagnetic waves	***The learner should be able to:*** a. Describe what is meant by wave motion as illustrated by vibrations in ropes, springs and disturbances in water. b. Explain the meaning of *speed, frequency, wavelength*, *period, amplitude, crest and trough.* c. Apply the relationship $v = f\lambda$ to solve related problems. d. Compare transverse	Waves transmit energy within different materials without displacing atoms in the material. Sound waves result from vibrations in matter. Speed of sound depends on the state of matter.	i) Learners demonstrate waves using ropes or water in a basin or pond and make a report ii) Carry out an activity to demonstrate the movement of transverse and longitudinal waves using a slinky spring or other methods. iii) Investigate reflection, refraction, diffraction and	1. Task learners to compare longitudinal and transverse waves using appropriate sketches 2. Assess learners on the use of the wave equation in solving different problems. 3. Task learners to draw sketches of wave

	and longitudinal waves and give suitable examples of each. e. Describe the behaviour of waves in terms of reflection, refraction, diffraction and interference. f. Describe the production of sound waves. g. Describe the longitudinal nature of sound waves. h. Demonstrate that a medium is required in order to transmit sound waves. liquids and solids. i. Describe the echo method for the determination of		interference of water waves using a ripple tank and discuss the observations. iv) In groups or as individuals, learners search and display the components of the electromagnetic spectrum, their sources, frequencies, wavelengths and their uses. v) Learners solve a numerical problems using the wave equation. vi) In groups, learners	patterns obtained when waves are reflected and diffracted in different cases. Allow for peer assessment 4. Task learners to identify the sources, applications and dangers ofelectromagnetic radiation. 5. Task learners to calculate the speed of sound in air using the echo method, from

	the speed of sound in air. j. Relate loudness of a sound wave to its amplitude and pitch to its frequency. k. Describe refraction, diffraction and interference of sound waves and their implications. l. Identify the components, properties and uses of the electromagnetic spectrum in order of their frequencies and wavelength.		demonstrate that sound requires a medium to travel vii) Learners carry out activity to show that sound waves undergo interference and diffraction viii) In groups, learners plan and carry out an activity to measure the velocity of sound in air using the echo method and discuss the limitations of the method. ix) In groups,	experimental data.

			learners demonstrate the difference between loudness and pitch.	

Topic/subtopic	Objectives	Key Concepts	Teaching/Learning Activities	Assessment Strategy
Term III				
TOPIC: Heat quantities				
1. Heat capacity 2. Latent heat 3. Boiling and evaporation 4. Saturated and unsaturated vapours, and SVP	***The learner should be able to:*** • Describe the change in temperature of a body in terms of a change in its internal energy. • Explain the terms *heat capacity* and *specific heat capacity*	Heat as a form of internal energy in substances can raise temperature of substances or cause change of state	i) Learners investigate the effect of supplying the same amount of heat energy for the same period on the temperature of	1. Task learners to explain land and sea breeze. Consider how learners use the

	• Apply the heat equation to solve numerical problems • Determine the specific heat capacity of different materials by method of mixtures. • Explain the difference between boiling and evaporation. • Explain the terms *latent heat* and *specific latent heat.* • Explain latent heat in terms of molecular behaviour. • Describe implications and applications of the high heat capacity and latent heat of water. • Sketch and interpret cooling/heating curves.		the same mass of different materials. ii) Learner's plan and carry out an activity to obtain a cooling/heating curve for a substance e.g. water and naphthalene, and explain the shapes obtained. iii) With guidance from the teacher, learners in groups, discuss the applications of latent heat.	concept of heat capacities in this explanation 2. Task learners to apply the heat equation in solving numerical problems.

TOPIC: Electrostatics				
1. Electric charges 2. The Gold-leaf electroscope 3. Lightning and thunder 4. electric fields	**The learner should be able to:** a) Explain how charges are produced on insulators b) State the law of electrostatics and use it to explain electrostatic induction. c) Distinguish between conductors and insulators. d) Describe the structure of a GLE and its uses. e) Explain the meaning of electric field and sketch electric field patterns for different situations. f) Explain how lightning occurs and describe how the lightning conductor works.	• Positive and negative charges can be produced in different forms of matter • Lightning is a result of charge accumulation in the atmosphere	i) In groups learners carry out an activity in which a plastic material rubbed with cotton or fur attracts small pieces of paper and explain why ii) Learners bring a charged plastic rod near the cap of a charged and uncharged GLE and discuss the observation iii) In groups, learners use ICT or other sources to search for recent	i) Learners explain different phenomena involving the application of the law of electrostatics ii) Sketching electric field patterns for different cases:

	g) State other applications of electrostatics.		destruction caused by lightning in Uganda and write a report, highlighting the places/regions most prone to lightning strikes and why iv) learners explain how a lightning conductor works	

BIOLOGY

SENIOR TWO BIOLOGY - ABRIDGED CURRICULUM

Introduction

The Senior Two abridged syllabus has been designed to address the learning gaps that were created as a result of the covid-19 pandemic. The syllabus is a combination of content from the new lower secondary biology curriculum for Senior One and Senior Two. The critical content has been sorted and put together to be taught in a period of one year. The abridged syllabus contains key concepts in all topics from both classes. In order to compensate for the lost time, concepts that were taught at primary level (for example parts of a flowering plant, drawing of teeth etc.) are left out. learning outcomes with similar content are merged or transferred to another class. Content that was not relevant to the abridged curriculum is also left out (for example systems and processes other than those in mammals). It is assumed that "Introduction to Biology" was covered during the time before the lockdown. It is hoped that the content areas included in this syllabus will enable the learner to acquire the target knowledge, understanding, skills and values for their progression. The teacher's and learners are encouraged to make reference to the Biology home study materials that can be accessed on the center's website www.ncdc.go.ug.

The matrix below shows the key changes that were made in abridging the Senior Two syllabus and their justification.

KEY CHANGES	JUSTIFICATION
All S.1 topics moved to S.2 except introduction to biology and all S.2 topics are maintained	These topics had not been covered before students went for lock down except Introduction to biology.
Classification: Learning outcomes on concepts of classification and naming of organisms are left out. Learning outcomes on characteristics and examples of some organisms are left out. Learning outcomes on Viruses are left out.	Concepts are not key in the abridged Curriculum. Learners are familiar with concepts on viruses from primary school and awareness campaigns on media.
Insects Learning outcomes on the dichotomous key are left out.	Concepts will be picked through various practical activities in classes ahead.
Flowering plants Learning outcomes on external parts of a flowering plant are left out.	Concepts dealt with at primary school level.
Soil Learning outcomes on types of soil and experiments on components of soil are left out.	Concepts are not key in the abridged Curriculum.

Detailed Syllabus

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
Cells **(10 periods)**	a) life processes are common to all living things, but they are manifested differently in different organisms b) know and understand the structure and functions of a typical animal cell and plant cell c) understand the structure of specialized cells in terms of their functions in an organism d) understand levels of organization in organisms (cell, tissue, organ, system, organism)	• In pairs, learners observe plants and animals, and identify characteristics that show that organisms are living. Identify, research on and record the seven characteristics of living things. • Observe prepared slides of plant and animal cells, draw cells and identify similarities and differences. • Draw and label the animal and plant cell as seen under a light microscope. • Research on the functions of the parts in a plant and	• Listen and observe as learners demonstrate orally or by completing a comparison table that they understand how animals and plants carry out nutrition, respiration, movement, excretion, growth and reproduction, and how they show sensitivity. • Listen to learners explaining why a machine such as a moving vehicle is a not a living organism. • Listen and observe as learners explain orally or in writing: • similarities and differences

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		animal cell, and annotate labels on cell diagrams accordingly. • Draw examples of specialised cells in animals and plants. Identify and explain the similarities and differences between the cells. • In groups, learners brainstorm, research on and list the different types of cells, tissues, organs and systems in the human body. Devise creative ways of explaining the five levels of organization (from simple to complex) to the class.	between plant and animal cells • structure and functions of cells, parts of cells and some specialised cells • different levels of organisation and their importance in large organisms • Observe group simulations showing the organ systems that need to work together when a person is: • dancing • eating • writing a story • Teacher involves class members in peer assessment and discussion of how groups could improve the quality

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
			of simulations. • Evaluate quality of learners' illustrations relating to each activity mentioned above.
Five Kingdom System of Living Organisms **(15 periods)**	a) know examples of organisms belonging to Kingdom Monera, Kingdom Protoctista and Kingdom Fungi b) understand the value of microorganisms in food-making processes c) identify three characteristics (cell structure, mode of feeding, and photosynthetic pigment) of organisms in Kingdom Plantae d) know examples of organisms from each of the following categories: vascular & non-vascular,	• Learners use pictures (and possibly microscope slides) as well as lists of group characteristics to identify organisms as belonging to the following groups: Monera/bacteria, Protoctista, Fungi, Plantae, and Animalia. • In groups, learners construct simple identification keys for grouping the organisms in the pictures, share their keys with other groups,	• Observe learners in groups as they develop and use identification keys. • Listen to learners' conversations and ask probing questions to check their understanding. • Observe and listen to group presentations • Evaluate quality of products such as keys, tables, experiment reports, diagrams, and drawings.

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	angiosperms & gymnosperms, monocots & dicots in Kingdom Plantae (No drawings required) e) identify and describe the common observable characteristics and give examples of organisms from phylum Arthropoda including its classes (No drawings required) f) Identify and describe the common observable characteristics (types of teeth, temperature regulation, habitat, reproduction, and gas exchange) and give examples of organisms from the phylum Chordata and its classes. No details of the reproduction process should be given	and then use them to identify other examples of organisms belonging to the same groups. • In groups, learners research on and make summary write- ups on the use of bacteria and fungi in the production of yoghurt, cheese, bread and alcohol. • In groups, learners research on the common characteristics and differences between examples of members of the kingdom Plantae belonging to the following categories: vascular/non-vascular, angiosperms/gymnosper	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		ms, monocots/ dicots. Groups choose the format to use to present their findings (tables, drawings or more creative methods) • Groups construct simple keys to place plants in the correct category. • In groups, learners research the common characteristics of arthropods and differences between members of the classes of arthropods. Groups choose the format to use to present their findings (tables, drawings or more creative methods) • Groups construct simple	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		keys to place animals in the correct category. • In groups, learners research the common characteristics (see list in learning outcomes) and differences between examples of members of the five main classes of the phylum Chordata: fish, amphibians, reptiles, birds, and mammals. Groups choose the format to use to present their findings (tables, drawings or more creative methods)	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
Insects (08 periods)	a) Identify the observable external features of a housefly, cockroach, bee, and butterfly (No details of mouth parts required) b) Appreciate the useful and harmful effects of a housefly, cockroach, bee, and butterfly c) Know the different methods of controlling the harmful stages of a housefly, cockroach, and butterfly	• In pairs, use a hand lens to observe a housefly, cockroach, bee, and butterfly; paying specific attention to the following structures: • head (mouth parts, antennae, eyes, hair) • thorax (wings, halters, hairs, strips, legs and the different segments) • abdomen • Pairs create a suitable table and record observations; comparing each of the insects. • Draw the insects provided, label the structures listed above and annotate drawings to explain the functions of	• Observe pairs carrying out activities and check that they identify the parts listed; create an appropriate comparison table; draw and label correctly; construct keys that work. • Listen to pairs' conversations and monitor understanding and progress towards learning outcomes. • Evaluate quality of products of each activity.

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		the structures. • Pairs construct a dichotomous key for any four of the insects listed above. • Pairs research on the different methods of controlling the harmful stages of a housefly, cockroach, mosquito, and butterfly. They produce a presentation advising the class on how to control these populations.	
Flowering Plants **(10 periods)**	a) understand how the structures of monocotyledonous and dicotyledonous roots, stems, leaves, flowers, and fruits suit their functions	• In groups, learners compare the structural features (root system, leaf venation, leaf shape, leaf attachment to stem, and flower colour) of a whole herbaceous	• Observe pairs carrying out activities, and check that they interpret specimens and identify functions correctly. • Listen to pairs' conversations and monitor

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	b) Classify leaves	dicotyledonous plant and whole monocotyledonous plant. Learners record their observations and present them to the class • In groups or as a whole class, learners discuss how the structures observed in the two plants carry out their functions. Annotate the drawings made above to explain how each structure is suited to its function. • In pairs, learners draw and label the parts of the flower. • In groups or as a whole class, learners discuss how each part of the	understanding and progress towards learning outcomes. • Monitor individuals' and groups' contributions to whole class discussion. • Evaluate quality of products from activities.

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		flower is suited to its function, and annotate the drawing made above to explain how. • In groups learners classify leaves using observable characteristics and construct a dichotomous key for not more than four leaves. • Pairs observe a bean seed and a tomato or other fruit, and write down the similarities and differences. Learners present their findings.	
PHYSICAL AND CHEMICAL PROPERTIES OF SOIL **(12 periods)**	a) determine soil constituents and identify their properties (u, s) b) understand that different soil samples have different properties: water retention, drainage,	• In pairs or groups, learners observe three different soil samples – clay, sand and loam, and: • examine the dry soil	• Observe pairs/groups as they examine soil samples. • Listen to conversations and ask questions to gauge and deepen

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	capillarity and pH; learners conduct experiments to investigate these properties (u, s) c) understand the importance of air and water in soil to other living organisms (u)	samples • Shake the samples in water and allow them to settle to show different layers/ particle sizes. • Pairs/groups record their observations relating to the following characteristics: • the colour of each soil sample • the texture of each soil sample • the size of particles in each soil sample • Task groups of learners to design, perform and report on investigations to show: retention, drainage and capillarity in loam, clay, and sandy	learning. • Evaluate products: records of characteristics of each soil type. • Observe groups and pairs carrying out activities. Check that they plan investigations that will give meaningful results. • Listen to pairs' discussions and monitor understanding and their progress towards learning outcomes. Ask probing questions to promote critical thinking and deepen learning. • Evaluate quality of products from activities: reports of investigations; conclusions relating to

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		soils. The report for each experiment should follow scientific methods. • In pairs, learners determine the pH of a soil sample and discuss the significance of their findings. **Group Project** **Aim:** • To investigate whether crop growth is different in different soil types. • Design and carry out an experiment using 20 annual plants (fast growing legumes) in soils with different percentages of contents; e.g. high clay content or high sand content.	impact of different properties on quality of soil; explanations of the impact of soil types on crop yield and reasons for it.

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		• Remember to make sure to design a fair test, controlling variables; e.g. the amount of water and light the plants receive. Observe the plants and record their appearance and the yield of the crop. From your observations deduce which type of soil is best for the chosen plants, and suggest why. Record conclusions.	
SOIL EROSION AND CONSERVATION: CAUSES, EFFECTS, AND PREVENTION (10 periods)	a) know the features of fertile soil (k) b) understand the process of and factors leading to soil erosion (u) c) understand the causes of reduced soil fertility and describe methods of soil conservation (u, v) d) outline the processes involved in the nitrogen cycle (u)	• In groups, learners discuss conclusions from Topic 2 and agree on a list of the features of fertile soil. Present their conclusions to the class. • In groups, learner's research on the causes of	• Through listening to group discussions, or through whole class discussion, gauge whether all learners understand the features of fertile soils, the causes and • impact of soil erosion, and the steps taken to increase

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		soil erosion and the impact erosion has on communities. Produce a short presentation to show the types and the possible impact. • In groups, learners discuss what steps farmers and gardeners in their locality take to maintain the fertility of their soils. Then research and write a report on the different methods used to maintain soil fertility and conserve soil in the following regions of Uganda: • Lake Victoria basin • Kigezi highlands • Karamoja region	fertility and reduce erosion • Observe groups carrying out activities and check that they communicate effectively and work as teams so that everyone is learning and developing skills • Listen to pairs' conversations and monitor their progress towards learning outcomes. Intervene as appropriate to deepen learning • Observe groups interacting and intervene as appropriate to steer research and project planning so that learning outcomes are achieved • Evaluate quality of

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		• In groups, learners carry out research into soil organisms that are called decomposers. Produce a short presentation/drama to explain why they are so important. • In groups, learners use labelled cards to role play and explain the nitrogen cycle. • In groups, learners design and carry out an investigation to show the presence of microorganisms in root nodules, soils and compost. Present their findings to the whole class and compare with other groups	products: presentations and reports

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		Group Project: • Design, perform and write a report on an investigation into the formation of compost in a compost bin. Report on the process of composting, how fast different materials decompose, any organisms (decomposers) that seem to be involved in the process, and anything else significant or interesting.	
NUTRITION TYPES AND NUTRIENT COMPOUNDS (06 periods)	a) identify the food nutrients, their sources, and importance to humans (u) b) perform food tests for various nutrients (only quality testing required) (s)	• In groups or pairs, learners carry out tests on foods such as potato, egg yolk, milk, groundnuts, and pineapple to determine what main	• Observe groups and pairs carrying out activities. Check they carry out tests and research effectively, and plan experiments that will give valid results.

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	c) appreciate the concept of balanced diet in relation to age, sex, and an individual's activity (u, v) d) appreciate the causes and effects of nutrient deficiency in humans including diseases related to malnutrition (u, s) e) identify the major plant mineral nutrients (N, P, K, Mg, Ca, S, Mg), their role, and the symptoms of deficiencies (u)	food nutrients they contain. • In groups or as a whole class, learners discuss, research and report on: • the meaning of the term 'balanced diet' and what this might mean for a baby, a child, an adult woman and adult, an athlete, and an inactive person. They record their conclusions. • the likely effects of an imbalanced diet • In groups, learners design and perform an experiment to compare the growth of a plant in distilled water and pond water and/or other water	• Listen to pairs' discussions and monitor understanding and progress towards learning outcomes. Ask probing questions to deepen learning • Evaluate quality of products from activities: reports and conclusions from tests and investigations; presentations, and explanations.

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		rich in nutrients. Learners use scientific method to write a report. • In groups, learners research on the uses of N, P, K, Mg, Ca, S and Mg to plants and the effects of deficiencies. Groups present their findings to the class (illustrated, if possible), with examples of leaves in good health, and showing deficiencies found in the locality.	
NUTRITION IN GREEN PLANTS (08 periods)	a) understand the meaning of autotrophic and heterotrophic nutrition (k) b) derive the meaning of the term photosynthesis and understand the process (u, s) c) perform experiments to investigate	• In pairs or groups, learners discuss, research on and document: • the meaning of autotrophic and heterotrophic nutrition • why autotrophs are the	• Listen to discussion and ask probing questions to promote critical thinking and guide learners towards learning outcomes. • Observe pair and group

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	the factors that affect the rate of photosynthesis (s, gs) d) appreciate the structures and adaptations that enable a leaf to carry out the process of photosynthesis (k, u)	providers of all food • the origin and meaning of the term photosynthesis • the equation for photosynthesis and its implications regarding what plants need for photosynthesis • In groups, learners design and carry out experiments to show the need for carbon dioxide, light and chlorophyll, during photosynthesis. Learners produce a formal report at the end of the experiments that includes the following: title, question, prediction, materials, procedure, record/analysis of results,	activities to monitor development of practical skills, effectiveness of experiment designs, and accuracy of models. • Evaluate products: conclusions from discussion and research; reports on experiments, findings about leaf structure, and 3D leaf models.

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		and conclusion. Groups present their report to the rest of the class • In groups learners examine diagrams, photographs or microscope slides of sections through a leaf and discuss how the structure is adapted so that cells can obtain the water, carbon dioxide, light, and energy they need. • Groups share findings and through whole class discussion agree on conclusions • Group Project: Develop a simple 3D model of the internal structure of a leaf	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		using locally available materials	
NUTRITION IN MAMMALS (11 periods)	a) understand the role of enzymes in influencing life processes; and appreciate that the working of enzymes may be affected by different factors (no details of lock and key mechanism required) (u, s) b) conduct experiments on and explain the effects of pH and temperature on enzyme activity (s, gs) c) know and identify different types of mammalian teeth, and relate their structure and position in the jaw to diet (k, u, s)	• In groups, learners research on and discuss the effects of enzymes on chemical reactions, list the properties of enzymes, and the names and functions of some enzymes, that work in the human digestive system. • Produce a presentation to explain findings. • In groups, learners design and carry out an experiment to determine the effect of one factor (pH or temperature) on	• Observe groups carrying out research and experiments to check that engagement in skills development and experiment designs is appropriate for achieving learning outcomes. Steer learners towards learning outcomes if necessary • Listen to, and engage in group conversations and ask probing questions to check and guide progress towards learning outcomes.

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	d) understand the importance of oral hygiene, and describe good practice in caring for teeth and gums in humans (u, v) e) appreciate the structure of the different parts of the mammalian alimentary canal, and its role in the digestion of food (k, u) f) understand how the end products of digestion are absorbed and assimilated (u)	enzyme activity. Share findings with other groups and develop understanding of the effect of pH and temperature on enzyme activity. Check findings against established science theory. • In pairs, learners observe a molar, canine, pre-molar and incisor tooth and identify: • the common structural features of each of the teeth in a mammal • the adaptations of each type of tooth to its function • Learners make an accurate labelled drawing	• Evaluate quality of products: findings on role of enzymes; explanation of effect of pH and temperature on the rate of reaction; clarity of drawings; accuracy and creativity of presentations; drawings; guide and dental formulae; experiment reports, simulations, mind maps/spider diagrams, descriptive reports

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		of each tooth and state the magnification. • In pairs, learners share experience and research on reasons for, and methods of ensuring dental hygiene as well as consequences of poor hygiene. Produce a short good practice guide. • In pairs, learners research on and write the dental formula for a herbivore, a carnivore and an omnivore. • In pairs, learners observe an unlabelled chart and, through discussion and research, identify and name the parts of the alimentary canal and	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		associated organs, labelling the parts and adding their functions • Guide groups of learners to design a controlled experiment to determine what substances are digested in the mouth: • include the hypothesis • describe the experimental design • indicate the control group(s) • describe the results of the test • In groups, learners simulate the process of digestion, its products and their absorption using either: • labelled cards with	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		names of parts of the alimentary canal and different food types • strings of beads that can be linked and unlinked • role play (holding hands to form long chain molecules,)	
TRANSPORT IN PLANTS (13 periods)	a) investigate the different ways in which materials move into, though, and out of cells (s) b) know how the root hair is adopted for absorption of water and mineral salts (u)	• In pairs, learners observe a tea bag in a clear glass container of still warm water for a period of five minutes, then discuss and explain their observations. Whole class discussion leads to understanding of the process of diffusion. • In groups, learners use scientific process skills to design and carry out an	• Observe pairs and groups carrying out activities. Check that they understand how to use resources effectively, take due account of prior learning, use research skills well, and plan valid experiments. • Listen to pair and group discussions, monitor progress towards learning outcomes and ask

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	c) understand the processes of transpiration and translocation (u) d) conduct experiments on and understand the factors that affect transpiration (s, u)	experiment to show the effect of solutions of different concentrations on raw unshelled eggs and raw potatoes. • Groups discuss and draw conclusions to explain their results. Individuals write reports at the end of the experiment that include the following: title, question, prediction, materials, procedure, record/analysis of results and conclusion. Groups present their work to the rest of the class. • In groups, learners discuss and research the meanings of diffusion, osmosis and active	questions to help learners develop skills and deepen understanding. • Evaluate quality of products from activities: report on root hairs; transpiration diagram; Translocation, and investigations of conditions affecting transpiration rates

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		transport, as well as the circumstances in which each is involved in the entry and exit of substances to and from cells. Groups present conclusions in a comparison table • In pairs, learners use a drawing and look at germinated seedlings to explain how the root hair is adopted for absorption of water and mineral salts. Pairs prepare a report to share with the class. Through whole class discussion, learners agree on the correct explanation, and record it in notes and or diagrams.	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		• In pairs, learners consider what they know about leaf structure, transport vessels in stems, roots and root hairs, and connect their learning to explain how the process of transpiration takes place. Individuals produce an annotated diagram to explain the process. • In pairs or groups, learners research on the need for, and the meaning of, translocation in plants. Share findings with the class before learners go on to explain in notes and diagrams. • In groups, learners use	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		scientific process skills to design and carry out experiments to investigate how wind, temperature, and light intensity affect the rate of transpiration. Groups consider the significance of their findings for farmers and growers, and report their findings and conclusions to the class.	
TRANSPORT IN ANIMALS (14 periods)	a) understand the principle of the surface area to volume ratio (s) b) know the need for a transport system, and identify the components involved in the transport system in mammals (k) c) describe the structure of the heart and how it functions (u, s) d) understand how structure of blood	• In pairs, learners use cubes of different dimensions to calculate the surface area to volume ratios of the cubes, then discuss and explain the biological significance of calculated ratios.	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	vessels are related to their function by comparing arteries, veins and capillaries (u, s) e) identify the major functions of blood, and relate the functions to the components of blood (u, s) f) understand the causes and prevention of diseases associated with the heart (high blood pressure, coronary heart disease and stroke) (u, v) g) understand the importance of knowledge of blood groups for blood transfusion (k, u) h) appreciate the role of blood in the defence of the human body (u) i) appreciate the function of the lymphatic system in maintaining a healthy body (u)	• In pairs, learners discuss what they already know about the components of their circulatory systems. • In pairs, learners discuss the structure and function of the heart, referring to diagrams and a model. Pairs share their thoughts in groups or whole class discussion. • Learners draw and label the parts of a mammalian heart adding clear notes relating to function. • In groups, learners design a model, visual aid, animation or drama to illustrate blood flow/circulation in the human body and present	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		to the class. • In pairs, learners research on structures of arteries, capillaries and veins, and produce tables, models or diagrams to show how structure is related to function in each case. • In pairs, learners research on components of blood and their functions and produce a table summarising their findings to share with the class. • Organise learners to visit a health facility to find out about the causes and prevention of high blood pressure, coronary heart disease, and stroke.	

Topic	LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
		Learners write a report on the causes and their prevention. • Learners watch a video clip or listen to a talk from blood bank personnel to find out the importance of blood transfusion and the possible risks involved. In pairs, learners complete a short report on the benefits and risks of transfusions, including compatible blood groups.	

CHEMISTRY

SENIOR 3 ABRIDGED CHEMISTRY CURRICULUM

Introduction

This Abridged S3 Chemistry Curriculum involves critical reduction of the concepts to be learned by transferring some concepts to related topics in higher classes, reducing time spent on tasks by reducing the activities to be done and or putting related concepts together such that they are handled concurrently. All this is intended to ensure that the learner learns the critical concepts that can enable them progress to the next classes where much more detail will be done.

Based on this premise, for the S3 Abridged curriculum, a number of topics have been merged because of their relatedness, others have been removed since they re redundant, while some have been transferred to Physics.

Some of the critical changes include the following:

S/N	Change	Justification
1	Chemical Families merged with Periodic Table,	The concepts are similar
2	The descriptions of properties of elements in Period 3 lifted from bonding and structure merged with Periodic Table	Key concepts are related
3	Acidity and Alkalinity merged with Acids, Bases and Indicators	To be taught together as they are related concepts.
4	Defining acid as proton donor and base as proton acceptor – removed	It is redundant concept at this level.
5	Effect of electricity on substances merged with electrochemistry	because the concepts similar.

The detailed syllabus is shown below.

Topic /subtopic	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
TERM 1 **TOPIC 1** **REACTIONS OF METALS WITH OXYGEN-REACTIVITY SERIES FOR METALS** **(6 Periods)**	Learners should be able to: •Define the term affinity. •Describe the reaction between a given metal and metal oxide. •Explain the reaction between a given metal and metal oxide. •State the order of elements in the reactivity series.	•Definition of affinity for oxygen •Displacement reactions •Competition reactions of the metals for oxygen •Experiments to demonstrate the reactions of metals with metal oxides e.g. CO_2/Mg, PbO/Mg •The reactivity series (K, Na, Ca, Mg, Al, C, Zn)	•Conduct a guided discussion on the definition of affinity for oxygen •Carry out experiments to demonstrate displacement reactions between metals and different metal oxides •Brainstorm on the deductions made on the above experiments •Assign the learners project work of designing their reactivity series based on the experiments carried out. •Have a guided discussion on the recognized reactivity series.

Topic/subtopic	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
TOPIC 2 WATER AND HYDROGEN **(12 Periods)**	Learners should be able to: •State the composition of water •Test for the products of burning organic matter •Explain the experiment showing that water contains hydrogen •State the products of reaction of water and steam with different metals •List the reactivity series obtained from metal/water reaction •State the physical and chemical properties of hydrogen •Outline the uses	•Composition of water •The water cycle •Industrial and domestic uses of water •Causes of water pollution •Pollution from fertilizers, insecticides and others •Agricultural wastes (only the pollution aspects) •Oil pollution of the sea and lakes; the dispersal of oil slicks •Hard and soft water •Definition •Causes of hard water •Removal of hardness (temporary and permanent	•Brain storm on the composition of water •Have a guided discussion on the water cycle •Carry out an experiment to demonstrate that water is one of the products formed when organic fuels are burnt •Carry out an experiment to show that water is an oxide of hydrogen •Carry out experiment to show the reaction between the given metal and water/steam • Assign the learners

Topic/subtopic	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
	of hydrogen •Explain oxidation as gain of oxygen and reduction as loss of oxygen with reference to metal oxide-hydrogen reactions •State industrial and domestic uses of water. •State the causes of water pollution •Define hard and soft water •Outline the methods of removing water hardness •	hardness, include ion exchange method). •Burning of organic matter (energy source) •Water as an oxide of hydrogen. (Burning hydrogen and a candle in air) •Reactions of metals with water/steam (Na, Ca, Mg with water and Mg, Zn, Fe with steam) •Test for hydrogen •Reactions of hydrogen gas •Uses of hydrogen gas: - •manufacture of margarine •weather balloons •manufacture of ammonia •Oxidation and reduction in terms	group project work to design a reactivity series based on the experiments conducted above • Have a guided discussion on the reactivity series • Carry out experiments to determine the physical and chemical properties of hydrogen

Topic/subtopic	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
		of gaining oxygen and losing hydrogen (use copper (II) oxide, hydrogen reduction).	• Assign the learners project work on the uses of hydrogen • Have a guided discussion on oxidation and reduction (limit these discussion to transfer of oxygen or hydrogen).

Topic/subtopic	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
TOPIC 3 ATOMIC STRUCTURE: (9 Periods)	Learners should be able to: •Define an atom •Name the particles of the atom •Draw the simple atomic structure •State the charges on each of the particles of the atom •Define atomic number, relative atomic mass and isotope •Write electronic configuration of various elements (1st 20 elements in the Periodic Table).	•Definition of atom •Particles of an atom •Draw the structure of an atom •Definition of atomic number and mass number •Definition of isotopes, relative atomic mass, and examples and their significance •Electronic configuration of the 1st 20 elements in periodic table •Positive and negative charges (should be introduced through simple	•Conduct a guided discussion on definition of an atom and the particles that make up an atom •Assign learners group work to design model of atoms of different elements using readily available materials •Conduct a guided discussion on definition of isotope and relative atomic mass •Conduct a guided discussion on how to write electronic

Topic/subtopic	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
		electrostatics, experiments with charges, rods and spheres.).	configuration of an element •Assign the learners project work on writing electronic configuration of the first 20 element •Carry out simple electrostatic experiments to demonstrate the effect of positive and negative charges.

	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
TOPIC4 THE PERIODIC TABLE (8 PERIODS)	Learners should be able to: •Define the Periodic Table •Describe the history of the periodic time •Arrange the first 20 elements in the Periodic Table •Identify metals, non-metals and noble gases in relation to outermost electrons •Describe the Period and group •State the specified reactions of the alkali, alkaline-earth metals and halogens •Describe the difference in reactivity within these chemical families	•Definition of the Periodic Table and its history •Groups in the Periodic Table (i.e. I, II, VII, O) and periods •Arrangement of the 1st 20 elements in the Periodic Table •Reaction of alkali metals (Li, Na, K) with air, water and chlorine •Reaction of alkaline-earth metals (Ca, Mg,) with air, water, chlorine and dilute acids • Reaction of halogens (Cl_2, Br_2, I_2) with sodium, water (bleaching action), zinc powder, sodium hydroxide solution • Noble gases -recognize their low reactivity based on their	•Conduct a guided discussion on the periodic table and its history •Discuss the electronic configurations of the first 20 elements in the periodic table in relation to their periods and groups •Assign project work of designing a periodic table, showing the first 20 elements •Conduct experiments to demonstrate the reaction of alkali metals with air, water and chlorine •Conduct experiments to demonstrate the

	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
	•State the properties of noble gas family and its un-reactivity •Predict the reactions and reactivity of elements within each family on qualitative basis •Explain the changes in bond type across the third period of the periodic table. •Describe the changes in bond type across the third period of the periodic table •Describe the trends in the physical and chemical properties of the elements of the third period of the periodic table.	electronic configuration • ***Note: Word equation should be used though formulae of simple compounds and elements may be given.*** •Influence of bond type on physical and chemical properties (melting point, solubility and electrical conductivity •Periodicity of bond type elements Na, Mg, Al, Si, S, Cl, Ar: their electronic structures, their ions (valence), mode of combination in oxide and chloride, inertness of noble gases, chemical and physical properties of metal and non-metals (across a	reaction of alkaline-earth metals with air, chlorine and dilute acids •Conduct experiments to demonstrate the reaction of halogens with sodium, water, zinc powder and sodium hydroxide •Conduct a guided discussion on the observations of all of the above experiments •Discuss the properties of noble gases •Discuss the trends in the physical and chemical properties of elements in the third period of the periodic table. •

	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
		period) • Elements: fluorine, chlorine, bromine and iodine (down the group). Electronic configuration, graduation in size of atom and ion, reaction • Elements, Li, Na, K (as above, including ease of oxidation, reaction with water, chlorine).	

Topic/subtopic	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
TOPIC 5 IONS AND IONIC COMPOUNDS (6 Periods)	Learners should be able to: •Define an ion •Describe an octet and duplet •Outline common ions •Determine valencies of different elements •Write simple chemical formulae •Define multivalency •Define a radical •Identify elements that are multivalent •Describe how simple ionic compounds are formed (e.g., sodium chloride).	•Definition of an ion •The characteristic features of the outermost energy level (i.e., octet and duplet) •Formation of ions and determination of valencies •The reaction between sodium and chlorine •The reaction between magnesium and oxygen •Common ions (e.g., Li^+, Na^+, Mg^{2+}, Ca^{2+}, Al^{3+}, etc. F^-, Cl^-, NO_3^-, CO_3^{2-}, etc. •Formulae of ionic compounds.	•Conduct a guided discussion on the definition of an ion •Brain storm on the characteristic features of the outermost energy level •Conduct a guided discussion on formation of ions and determination of valences •Assign group work in which the learners are to write out formulae of various ionic compounds.

Topic/subtopic	Specific objective	Content	Teaching-learning strategy
TERM 11 **TOPIC 6 ATOMIC, MOLECULAR STRUCTURE AND BONDING** **(10 Periods)**	Learners should be able to: •Define bonding •Describe the formation of electrovalent bond, covalent bond and metallic bond •Identify different elements which form the above bonds •Describe the role of the outermost electrons in chemical bonding •Explain qualitatively the formation of the covalent and ionic bonds •Illustrate, using diagrams, the covalent and ionic bonds in simple compounds •Differentiate	•Definition of bonding •Description of electrovalent, covalent, dative and metallic bonding •Differences between electrovalent, covalent, metallic and dative bonding •The role of outermost electrons in chemical bonding •Qualitative treatment of the energetic of chemical bonding. Consider the molecules in terms of a position of balance between p-p, e- e repulsion	•Conduct a guided discussion on the definition of bonding •Assign the learners group work to design models to represent each type of bonding using readily available materials •Brainstorm on the differences between electrovalent, covalent, dative and metallic bonding •Discuss the definition of chemical bonding and the role of valency electrons in chemical

Topic/subtopic	Specific objective	Content	Teaching-learning strategy
	between bond types on the basis of chemical and physical properties of substances. •	and p-e attraction (ionic bond as an extreme example) •Significance of the noble gas configuration, covalent bond as electrons sharing, ionic bond as electron – transfer Consideration of C-C and C=C •Influence of bond type on physical and chemical properties (melting point, solubility and electrical conductivity •Molecular, giant atomic and giant ionic structures (iodine, carbon {diamond} and sodium chloride respectively •Metallic bond	bonding •Assign learners group work on using models to illustrate different types of bonding •Conduct a guided discussion on the influence of bond type on chemical and physical properties of substances.

Topic/subtopic	Specific objective	Content	Teaching-learning strategy
		related to electrical conductivity only.	

TOPIC /SUBTOPIC	SPECIFIC OBJECTIVE	CONTENT	TEACHING AND LEARNING STRATEGIES
TOPIC 7 **ACIDS, BASES AND INDICATORS** **15 Periods**	learners should be able to: •Define an acid, base and indicator •Prepare and use plant extracts as acid – base indicators •Use universal indicator to determine the pH of solution •State characteristics of acids and bases •Recognize the difference between weak and strong acids and bases	•Definition of acid, base and indicator •Indicators •Preparing and using indicators (flower, extracts as simple indicators.) •Universal indicator (pH scale.) •Acidic, neutral and basic/alkaline solution •Strength of acids and bases •Simple properties of mineral acids. Test solutions: NH_4Cl, $(NH_4)_2SO_4$, NH_3, NaOH, H_2SO_4, etc.) Weak and strong acids	•Conduct a guided discussion on the definition of acid, base and indicator •Conduct experiments to prepare indicator from plan extracts such as flower extract and the tea leaves •Conduct experiments using universal indicator to classify substances as strong or weak acids or bases •Brainstorm on

TOPIC /SUBTOPIC	SPECIFIC OBJECTIVE	CONTENT	TEACHING AND LEARNING STRATEGIES
	•Give examples of acids and bases •Explain the role of solvent in the acidity of hydrogen chloride •Write ionic and formula equations for specified acids-base reactions •Outline some applications of acid – base neutralization	•Definition of strong/weak acids and bases •Determination of the strength of acids /bases by use of: - - pH - electrical conductivity - rate of reaction with marble chips and magnesium with acids (Use hydrochloric acid/ethanoic acid and sodium hydroxide/aqueous ammonia as illustration) ***Note: Other examples are tartaric and citric acids instead of HCl.*** •Role of the solvent - Hydrogen chloride or tartaric acid in methyl benzene	the definition of strong/weak acids and bases •Carry out experiments to demonstrate the strength of an acid or base •Carry out experiments to demonstrate the role of a solvent in influencing the properties of acid anhydrides and dry ammonia •Brainstorm on application of acid-base neutralization reactions.

TOPIC /SUBTOPIC	SPECIFIC OBJECTIVE	CONTENT	TEACHING AND LEARNING STRATEGIES
		compare with aqueous solutions. React with dry litmus, magnesium, marble chips - Reaction of dry and aqueous ammonia. Importance of $H^+_{(aq)}$ and $OH^-_{(aq)}$. • Use of ionic equations to illustrate the above • Neutralization reactions of acids and bases • application of acid – base neutralization reactions.	

TOPIC/SUBTOPIC	SPECIFIC OBJECTIVE	CONTENT	TEACHING AND LEARNING STRATEGIES
TOPIC 8 **SALTS (IONIC COMPOUNDS)** **9 Periods**	Learners should be able to: •Define salt •Identify soluble and insoluble salts •Select an appropriate method for preparation of a particular salt •Explain the terms solution, saturated solution, crystallization, neutralization and precipitation •Describe and explain from experimental observations, the action of heat on various salts.	•Definition of salt •Normal salts and acid salts •Soluble and insoluble salts •Solution •Crystals •Crystallization by evaporation •Preparation of soluble salts •Preparation of insoluble salts- double decomposition •Preparation of salts by direct synthesis •Hydrated salts •The effect of heat on salts	•Conduct a guided discussion on the definition of a salt and the different types of salts •Conduct experiments to prepare various types of salts •Assign learners project work of growing a crystal (this can be done as group work) •Conduct experiments to observe the effect of heat on various salts. •Brainstorm on the deductions made in the experiments on action of head on salts.

Topic /subtopic	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
TERM 3 **TOPIC 9THE MOLE CONCEPT: FORMULAE AND CHEMICAL EQUATION (15 Periods)**	Learners should be able to: • State some experimental evidence for the existence of atoms, molecules, ions and electrons • Use the kinetic theory to explain the nature of solids, liquids and gases • Define the mole, molar solution and molar gas volume • Use the mole, molar solution and molar gas volume in defining chemical formulae and equation from both experimental results and given data	• Evidence for particles i.e. diffusion, Brownian motion • Evidence for the existence of electrons (i.e., plastic comb) - Cars and electric shock, lightning • Evidence for existence of ions • The gas laws (Boyle's law, Charles's law general gas law) • The mole as a basic unit • Determination of formulae; ionic compounds, empirical and molecular formulae - Quantitative determination of magnesium oxide (Mg/air)	• Conduct experiments to demonstrate the existence of atoms molecules, ions and electrons • Discuss the definition of mole, molar solution and molar gas volume • Demonstrate to the learners how mole, molar solution and molar gas volume can be manipulated to solve any given problem related to the mole concept • Carry out titration experiments to determine

Topic /subtopic	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
	• Represent a chemical reaction by either a full formula or ionic equation.	and copper (II) oxide (reduction of copper (II) oxide with butane should be carried out.) • Molar gas volume (22.4 dm^3 at S.T.P), atomicity of gases, mass volume relationship for gases • Molar solutions • Stoichiometry of chemical reactions, quantitative work must be emphasized. • Reactions to be considered - $Ba^{2+}_{(aq)} + CO_3^{2-}$ (s) - Pb^{2+} (aq) + $2I^-$ (aq) • Titration of NaOH with HCl and H_2SO_4 recommended. • (***Note:***	concentration of a given solution.

Topic /subtopic	Specific Objective	Content	TEACHING AND LEARNING STRATEGIES
		Reactions in this section show quantitatively that mass is conserved. • $Ba^{2+}(aq) + CO_3^{2-}(aq) \rightarrow BaCO_3(s)$	

TOPIC /SUB-TOPIC	OBJECTIVE	CONTENT	TEACHING/LEARNING ACTIVITIES
TOPIC 10 **CARBON CHEMISTRY** **(9 Periods)**	Learners should be able to: • Explain the physical properties of the carbon Allotropes in terms of their bonding and how these properties are related to the uses of the allotropes • Describe the preparation and properties of carbon dioxide • Describe the	Definition of allotropy and allotropes • Forms of carbon - Diamond, graphite and charcoal: structure, physical properties and uses (relate uses to structure and physical properties) • Chemical properties of carbon - Consider	• conduct a guided discovery discussion on the definition of allotropy and allotropes • Brainstorm on the different forms of carbon • Discuss the physical properties of each of the different forms of carbon • Conduct experiments to demonstrate the chemical properties

TOPIC /SUB-TOPIC	OBJECTIVE	CONTENT	TEACHING/LEARNING ACTIVITIES
	chemical reactions of carbonates and hydrogen carbonates • Explain the importance of carbon compounds in the natural environment and in industry • Explain the physical and chemical properties of carbon monoxide • Explain the use of carbon dioxide in fire extinguishers • Extinguish fire breakouts in environments.	combustion, reaction with acids and reducing action • Preparation and properties of carbon dioxide. (Relate methods of collection to the properties of the gas) • Reaction of CO2 with water, lime water and alkalis • Uses of CO2 e.g. - Soft drinks manufacture - Refrigeration - Baking - Fire extinguishers • Principles and methods of extinguishing ▪ fire of different types (practical) Carbon monoxide - Combustion, reducing action poisonous	of carbon • Brainstorm on the uses of each form of carbon • Conduct an experiment to show how carbon dioxide is prepared in the laboratory • Conduct experiments to demonstrate the chemical properties of carbon dioxide • Brainstorm on the uses of carbon dioxide and the effects on the environment.

TOPIC /SUB-TOPIC	OBJECTIVE	CONTENT	TEACHING/LEARNING ACTIVITIES
		fumes (car exhausts, coke fire). Laboratory preparation **NOT** required Reducing action illustrated with copper (II) oxide and blast furnace (see extraction of iron) ***(Note: only theoretical treatment required because it is poisonous.)*** • Carbonate and hydrogen carbonates - Action of heat and dilute acids on some carbonates and hydrogen carbonate - Production of soda ash (Lake Magadi, Soda Company	

TOPIC /SUB-TOPIC	OBJECTIVE	CONTENT	TEACHING/LEARNING ACTIVITIES
		and Solvay process (Applied chemistry) ***Note: Use simple schematic diagram to illustrate solvay process.*** • Importance of carbon and its oxide - Carbon cycle - Equilibrium of the atmosphere via the oxygen and carbon dioxide cycles. - The effect of carbon dioxide and carbon monoxide on the environment.	
TOPIC 11 **ORGANIC CHEMISTRY** **(12 Periods)**	By the end of this topic, the learner should be able to identify various organic compounds and their uses. Learners should	Definition of organic chemistry and hydrocarbon • Alkanes (methane to butane). - Formulae only.	• Conduct a guided discussion on the definition of organic chemistry and hydro carbon • Discuss the nomenclature and

TOPIC /SUB-TOPIC	OBJECTIVE	CONTENT	TEACHING/LEARNING ACTIVITIES
	be able to: ▪ Define organic chemistry ▪ Define a hydrocarbon ▪ Name and draw the structure of the first four alkanes ▪ Name the sources of alkanes ▪ Name and give the uses of the five fractions of crude oil ▪ Explain the physical and chemical properties of the homologous series of alkanes, alkenes, and alcohols ▪ Describe the methods of preparing	• Sources - Natural gas - Fractional distillation of crude oil (five fractions and their uses) • Combustion – internal combustion engine as a major source of atmospheric pollution (refer to unburnt C, CO, CO_2, Pb compounds, unburnt hydrocarbons) • Alkenes (ethene only) - Ethene: Formulae - Preparation of ethene by dehydration of ethanol - Combustion - Reaction with bromine - Polymerisation • Cracking	structures of alkanes with the aid of models • Discuss the natural sources of alkanes • Discuss the chemistry behind the internal combustion engine. Emphasis should be on the pollution effects of the by-products of this combustion • Carry out an experiment to prepare ethane ▪ Carry out experiments to demonstrate the physical and chemical properties of ethane ▪ Conduct a guided discussion on natural and synthetic fibres ▪ Brainstorm on the

TOPIC /SUB-TOPIC	OBJECTIVE	CONTENT	TEACHING/LEARNING ACTIVITIES
	alkenes and alcohols ▪ State the different types of plastics and their properties ▪ State the uses of alkanes, alkenes, and alcohols ▪ List some natural and synthetic fibres and state their uses ▪ State the advantages and disadvantages of synthetic materials compared to those of natural origin in terms of both structure and properties ▪ Derive the structure of a polymer from a	- Thermal and catalytic (of Perspex) • Plastics (Thermoplastics and thermosetting plastics) e.g., rubber, Perspex) • Advantages and disadvantages of plastics Natural polymers (cellulose e.g., cotton, wood, paper) • Natural protein fibres, wool, silk, natural dyes and colouring of fibres • Natural rubber and its vulcanization • Advantages and disadvantages of man made polymers over those of natural origin • Alcohols	uses of natural and synthetic fibres ▪ Assign the learners group work on discovering the advantages and disadvantages of natural polymers over synthetic polymers ▪ Carry out an experiment to prepare ethanol from sugar ▪ Assign learners project work of preparing ethanol from starch using local materials ▪ Carry out experiments to demonstrate the properties of ethanol ▪ Brainstorm experiments to extract fats and oils from local sources ▪ Carry out an

TOPIC /SUB-TOPIC	OBJECTIVE	CONTENT	TEACHING/LEARNING ACTIVITIES
	monomer (polyethene).	(Ethanol only) - Preparation by fermentation (of starch and sugar) - Properties – physical, combustion and dehydration only - Uses • Fats and oils (local sources) - conversion into soap - Soap Laboratory preparation How soap works • Soapless detergents - Definition - Laboratory preparation - Advantages and disadvantages of soap and soapless detergents (Teacher demonstration of laboratory preparation of detergents	experiment to prepare soap ▪ Discuss the cleansing action of soap ▪ Discuss the definition of soapless detergent ▪ Carry out an experiment to demonstrate the preparation of a soapless detergent ▪ Brainstorm on the advantages and disadvantages of soap and soapless detergents.

TOPIC /SUB-TOPIC	OBJECTIVE	CONTENT	TEACHING/LEARNING ACTIVITIES
		from castor oil and concentrated H_2SO_4) (Applied Chemistry) ***Note: a detailed study of the organic chemistry of alkanes, alkenes, and alcohol etc is not required.***	

AGRICULTURE

ABRIDGED SYLLABUS OF AGRICULTURE

SENIOR THREE

RATIONALE OF THE AGRICULTURE SELECTED CONTENT FOR TEACHING

Agriculture teaching and learning at secondary school builds on the foundation made in primary school integrated science. Teaching agriculture in primary school classrooms introduces young people to basic scientific procedures of growing crops and rearing animals. It shows them how to apply these integrated science lessons into our daily lives. For example, a great primary school science teacher can teach pupils about the art and science of growing crops, rearing animals and processing both crop and animal products. This means that it is not only teaching learners how to be farmers, but also train tomorrow's scientists, nutritionists, processors, teachers and so much more.

The topic selection has therefore been done meticulously to ensure that those who participate in secondary school agricultural training attain the skills necessary to become productive citizens as practitioners of crop and animal production. This lends itself into learning about tools, equipment, land tenure, farm building, farm structures and basic science. This is to say that agriculture puts machines, engineering, building technology, food processing, marketing, chemistry, biology and physics into everyday-life application.

The topics below emphasize a mix and a combination of classroom instruction and application of agriculture experiences outside the classroom. At the same time, it equips the learners with experience that can enable them succeed in postsecondary education or the workforce for the labour market. The selection allows you to build the foundation for educated consumers and agriculturists.

SN	CRITICAL CHANGES	JUSTIFICATION
1	Change of Spiral Curriculum Design to one where Related Concept are Combined	All topics in crop production and animal production have been combined. This is because in agriculture the emphasis is on growing crops, rearing animals and using the current knowledge of production. The following topics in crop production will therefore be compulsory: Vegetable growing; weeds and their control; crop pests and their control; crop diseases and their control. In addition, teachers are advised to choose one other crop according to the resources available. The selection will be made from a list of five (5) topics. In animal production, cattle production and farm structures are compulsory. In addition, teachers are advised to choose one other animal according to the resources available. The selection will be made from a list of two (2) topics. To teach agriculture practically, the school may not have all the resources, funds and space. You are encouraged to seek opportunities of mobilizing the requirements from the community and stakeholders. You can arrange with the parents, donors, local governments to offer resources, land, funds and space for internship of your learners.

TOPIC 1. VEGETABLE GROWING (compulsory)

GENERAL OBJECTIVE:

To enable the learner acquire and use knowledge of growing vegetables profitably

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1.Vegetable Growing	• Explain the importance of vegetable growing. • Classify vegetable crops according to families. • Choose a suitable site for growing vegetables.	• Importance of vegetables. • Classification of vegetables. • Choosing a site for a vegetation garden.	• Guided discussion • Demonstration of how to choose a garden for a chosen vegetation. • Projects-on vegetable growing.
2.Nursery Management	• Construct a good nursery bed. • Plant seeds. • Care for seedlings in a nursery i.e. shading, watering, pest	• Establishing a nursery: - Site selection for a nursery - Nursery bed preparation - Manuring and soil fertilization - Planting in a	• Practical demonstration of siting, establishing and managing a nursery.

	and disease control and pricking out.	nursery • Managing a nursery - Watering - Weeding - Spraying against pests and diseases - Pricking out - Hardening off - Potting if need be	
3. Transplanting	• Transplant seedlings	• Transplanting: - Timely transplanting - Spacing - Digging planting holes - Manuring/ fertilizers application - Lifting seedlings from the nursery - Placing them in the holes and covering with soil - Providing of shade • Watering the seedlings	• Demonstration of transplanting seedlings. • Practicals on transplanting
4. Field Management Practices	• Manage a vegetable crop to the time of harvesting.	• Field management practices: - Transplanting - Watering - Pest and disease control	• Practical demonstration on - Pruning - Staking - Harvesting

		- Pruning -Staking - Manuring - Weeding • Harvesting	• Project work on growing vegetables
5. Post-harvest Practices	• Process and store crop produce appropriately	• Post-harvest practices: - Processing - Storage - Marketing	• Provide space for learners to set up marketing stalls for vegetables at appropriate points in school and in the community to sell their produce and products. • Practical demonstration of washing tomatoes, sorting and grading, storing, packing • Market visit to see vegetable marketing.
6. Vegetable Rotation	• Explain the principles of vegetables rotation. • Design a good vegetable	• Principle of vegetable rotation: - Advantage of vegetables rotation. • Examples of	• Guided discussion • Demonstration of rotation in the school garden.

	rotation.	possible vegetable rotation.	
7. Production of various Classes of Vegetables e.g. - Tomatoes - Cabbage Onion	• Grow vegetables successfully at school and at home.	• For each vegetable crop cover: - Varieties - Plant characteristics - Ecology. - Agronomic practices. • Processing, storage and marketing.	• Guided discussion. • Demonstration of the various practices of vegetable growing. • Project work on the growing of vegetable crops

SELECT ONE TOPIC IN CROP PRODUCTION

TOPIC 2a: PERENNIAL CROPS [coffee]

GENERAL OBJECTIVE:

To enable the learner acquire knowledge and skills in the production of perennial crops.

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1. Coffee Growing	• Explain and demonstrate correctly the agronomic practices in the growing of coffee.	• Coffee growing: • Coffee plant characteristics • Varieties (Arabica, Robusta) • Growth requirements • Coffee nursery management: • Benefit of seed propagation of coffee. • Advantages and disadvantages of vegetative propagation of coffee. • Nursery management practices for seedlings and cuttings. • Agronomic/ field management practices: • Seedbed preparation	• Demonstration on the practices used in the production of coffee. • Projects: on coffee growing • Provide space for learners to set up marketing stalls for coffee at appropriate points in school and in the community to sell their produce and products. • Field visit to commercial coffee plantations and processing plants to observe agronomic

		• Fertilizer application • Transplanting and spacing • Provision of shade • Mulching • Weed control • Pruning • Weed control • Pruning • Pest and disease control • Harvesting • Processing: • Wet processing • Dry processing	practices and processing coffee. • Practical exposure on agronomic practices e.g. mulching, weed control, fertilizer application, pruning.

TOPIC 2b: PRODUCTION OF CEREALS AND LEGUMES

GENERAL OBJECTIVE:

To enable the learner acquire and apply the knowledge and skills of growing cereal crops profitability

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1 Introduction to Cereals Production	• Explain the importance of cereals. • Identify the characteristics of cereal crops.	• Importance of cereals. • Characteristics of cereals. • Examples of cereals.	• Guided discussion and practical observation of cereal crops: maize, millet, rice, sorghum.
2 Growing of a cereal crop: - maize - millet - sorghum	• Explain the importance of the crop. • Accurately describe the cereal crop using its botanical characteristics. • Describe the agronomic practices involved in the growing of the chosen cereal	• Importance of the crop. • Plant characteristics. • Ecological equipment. • Methods of propagation. • Agronomical practices. • Post-harvest practices.	• Guided discussion on husbandry practices of cereals. • Project work on growing cereal crops. • Provide space for learners to set up marketing stalls for cereals at appropriate points in school and in the

	crop.		community to sell their produce and products.
3 Introduction to Legume Production	• Explain the importance of legumes. • Accurately describe the leguminous crop using its botanical characteristics.	• Importance of legumes • Characteristics of legumes	• Guided discussion. • Observation of legume crops: beans, peas, ground nuts, soya beans.
4 Growing of legume Crops: • Beans • Peas • Ground nuts • Soya beans	• Describe the ecological requirements and agronomic practices involved in the growing of the chosen leguminous crops.	• Plant characteristics • Ecological requirements. • Methods of propagation. • Agronomic practices. • Post-harvest practices.	• Project- on growing legume crops. • Provide space for learners to set up marketing stalls for legume at appropriate points in school and in the community to sell their produce and products.

TOPIC 2c: ROOT CROPS

GENERAL OBJECTIVES:

To enable the learner grow root crops

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1 Importance of root crops	• Explain ways in which root crops are importance to us.	• Importance of root crops: - Source of food - Source of animal feeds - Source of income - Source of raw materials for industry	• Discussion on the importance of root crops.
2 Common Root Crops in Uganda.	• Identify the common root crops grown in Uganda.	• Common root crops: - Cassava - Sweet potatoes - Coco yams - Irish potatoes	• Observing root crops and describing their characteristics.
3 Growing Root Crops	• Describe the stages in the growing of root crops. • Grow root crops	• Steps in growing root crops: - Field preparation - Selection of planting materials - Planting - Spacing and seed rate • Field practices	• Demonstration of the practices in growing root crops • Carrying out root crop growing practices • Projects: on root crops • Provide space for

		(weeding, manure/ fertilizer application, pests and disease control, pruning, mulching and thinning) • Harvesting • Processing • Storage • Marketing	learners to set up marketing stalls for root crop at appropriate points in school and in the community to sell their produce and products.

TOPIC 2d: FIELD CROPS

GENERAL OBJECTIVES:

To enable the learner grow field crops profitably

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
20.1: Importance of Field Crops	• Explain the ways in which field crops are important to us.	• Importance of field crops: - Source of food - Source of animal feeds - Source of income - Source of raw materials for industry	• Discussion on the importance of keeping cattle.
20.2: Common	• Identify common field	• Common field crops in Uganda:	• Observing field crops and

Field Crops in Uganda	crops grown in Uganda.	- Cotton - Sunflower - Tobacco - Simsim	describing their characteristics.
20.3: Growing Field Crops	• Describe the stages in the growing of field crops. • Grow field crops.	• Steps in growing field crops: - Field preparation - Selection of planning materials - Planting - Spacing and seed rate - Field practices (weeding, manure/ fertilizer application, pests and disease control, pruning, mulching and thinning. - Harvesting - Processing - Storage - Marketing	• Demonstration of Agronomic practices in growing field crops. • Carry out field crop growing practices. • Provide space for learners to set up marketing stalls for field crops at appropriate points in school and in the community to sell their produce and products. • Projects on field crops.

TERM TWO

TOPIC 1: WEEDS AND THEIR CONTROL (compulsory)

GENERAL OBJECTIVE:
To enable the learner effectively control weeds

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1. Economic importance of Weeds	• Explain what the term weed. • Explain the ways in which weeds are import to us.	• What is meant by the term weed? • Economic importance of weeds: - Advantage of weeds - Disadvantages of weeds	• Brainstorming. • Discussion on advantages and disadvantages of weeds.
2. Classification of Weeds	• Identify and classify common weeds.	• Classification of weeds: - Annual and perennial. - Broad-leaved and narrow leaved - Terrestrial and aquatic. - Grasses, sedges, herbaceous, woody.	• Collecting weed specimens, identifying and classifying them. • Ask learners to make weed albums to show the type of weeds in their areas. • Preserving weeds.

3. Adaptation of Weeds to the Environment	• Explain the ways in which weeds are adapted to the environment for survival.	• Adaptation of weeds to the environment: - Production of many seeds. - Efficient dispersal mechanisms. - Resistance to disease and pests. - Dormancy of seeds in unfavorable conditions. - Hardiness i.e. surviving in less fertile soils and little moisture	• Discussion of the weed adaption mechanisms. • Observation of weed specimens to identify and describe the features by which they survive. • Ask learners to prepare organic tea/weed killer; apply them to infested areas and observe the impact.
4. Control of weeds	• Describe measures taken to control weeds. • Carry out measures to control weeds.	• Weed control methods: - Cultural - Mechanical - Chemical - Biological - Integrated weed management	• Discussion of the weed control methods. • Demonstration of the methods of weed control. • Practicing the methods of weed control.

TOPIC 2: CROP PESTS AND THEIR CONTROL (compulsory)

GENERAL OBJECTIVE:

To enable the learner effectively control crop pests.

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1. Importance of Pests in Crop Production.	• Explain the term pest. • Explain the ways in which pests affect crop production.	• Meaning of the term pest. • Importance of pests in crop production: - Lower quality and quantity of yield. - Increased cost of production. - Making harvesting difficult. - Transmission of diseases.	• Brainstorming and explanation. • Discussion on importance of crop pests. • Observation of crop plants/ parts and products damaged by pests.
2. Damage caused by Pests.	• Describe the types of damage caused by pests on crop plants and their products.	• Pest damage: - Biting and chewing plant parts. - Sucking plants - Boring into plant parts - Distorting plant parts	• Observation of various types of damage on crop plants, products and describing them.
3.	• Identify and	• Classification of	• Discussion on the

Classification of Pests.	classify crop pests.	crop pests: - Regular and irregular - Minor and major - Chewing and sucking - Field and storage pests	ways of classifying pests. • Observation of pest specimens to identify features used to classify them.
4. Control of Pests.	• Describe and carry out measures used to control crop pests.	• Pest control methods - Cultural - Physical - Chemical - Biology - Integrated pest management	• Discussion of the methods of pest control. • Demonstration of pest control methods. • Practicing pest control methods. • Ask learners to prepare organic pesticides; apply them to infested areas and observe the impact.

TOPIC 3: CROP DISEASE AND THEIR CONTROL (compulsory)

GENERAL OBJECTIVE:

To enable the learner effectively control crop diseases

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1. Definition of Crop Disease.	• Explain the meaning of the term disease.	• Meaning of the term crop disease.	• Brainstorming on disease.
2. Importance of Disease in Crop Production.	• Explain the effects of plant disease on crop production.	• Importance of diseases in crop production: - Lowering quantity and quality of yield.	• Discussion of the effect of disease on crop production. • Observation of effects of diseases on crops and products.
3. General Symptoms of Crop Diseases.	• Describe the symptoms of crop diseases.	• General symptoms of diseases: - wilt - smuts - cankers - rusts - spots - chlorosis - streaks - rosette	• Observation and description of disease symptoms on crop plants.

		-mottles - mosaics - wrinkles	
4. Classification of Crop Diseases.	• Identify and classify crop diseases according to their casual agents.	• Classification of crop diseases - Viral - Bacterial - Fungal	• Observation of disease symptoms to identify the causal organisms.
5. Spread of Crop Diseases.	• Describe the ways in which crop diseases are spread.	- Spread of crop diseases: -soil - -vectors -contact - -wind -tool & equipment - -water -planting materials	• Discussion on the ways in which diseases spread
6. Control of Crop Diseases.	• Describe and practice methods used to control crop diseases.	• Crop disease control measures: - Cultural - Chemical - Integrated	• Discussion of disease control measures. • Practicing the control of diseases. • Ask learners to prepare organic tea/pesticides; apply them to infested areas and observe the impact.

SELECT ONE TOPIC IN ANIMAL PRODUCTION

TOPIC 4a: POULTRY PRODUCTION

GENERAL OBJECTIVE:

To enable the learner acquire and utilize knowledge and skills of rearing poultry profitably.

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1. Introduction to Poultry Keeping.	• Explain the importance of poultry farming. • Outline the problems associated with poultry keeping in Uganda. • State the requirement for starting poultry project. • Identify the parts of a domestic fowl. • Distinguish between the different	• Importance of poultry keeping in Uganda. • Problems associated with poultry keeping in Uganda. • Requirements for starting a poultry project. • Points of a domestic fowl. • Types and breeds of domestic fowls.	• Guided discussion on the importance of keeping poultry in Uganda. • Group discussion and presentation on problems associated with poultry keeping in Uganda and the requirements for starting a poultry project. • Observation of

	breeds and types of poultry.		the parts of a fowl and the breeds of poultry
2. Breeding in Poultry.	• Draw and label the male and female reproductive systems of a fowl. • Identify the parts of an egg. • Explain the process of egg formation.	• Reproductive system of a cock. • Reproductive system of a hen. • Structure of an egg. • The process of formation of an egg.	• Observation of the parts of the reproductive system of a male and female fowl. • Observation of the parts of an egg. • Guided discussion on the processes of egg formation.
3. Incubation of Eggs	• Explain the conditions necessary for proper hatching of eggs. • Explain the criteria used for choosing hatchable eggs. • Describe the methods of incubating	• Factors necessary for hatching of eggs. • Selection of eggs for incubation. • Methods of incubation - Natural methods (mother hen) - Artificial incubation • Sexing of day-old chicks	• Guided discussion on conditions necessary for hatching eggs; the criteria used in selecting hatchable eggs and the criteria for identifying female chicks. • Generate

	eggs. • Identify female and male chicks using their distinguishing characteristics.		records in poultry production.
4. Brooding	• Describe the various systems of brooding chicks. • Distinguish between different types of brooders. • Prepare a brooder for receiving day old chicks. • Participate actively in the management of chicks in a brooder. • Explain the causes of chick mortality	• Natural brooding. • Artificial brooding: - -types of brooders - -preparation of chicks • Management of chicks: - Feeding of chicks - Housing - Health management • Causes of mortality of chicks in a brooder	• Guided discussion on the various systems of brooding chicks. • Demonstration and a practical session on preparing a brooder. • Demonstration and practical session on feeding, housing and maintenance of hygiene in poultry houses.
5. Rearing of Laying Birds and Table Birds	• Describe the system of rearing birds and the	• Systems of raring birds. • Advantage and disadvantage of	• Guided discussion on the systems of rearing laying

	advantages and disadvantages of each • Correctly carry out the recommended practices used in rearing laying and table birds.	the system • Shelters used • Rearing laying birds: - Housing - Management of litter - Feeding of laying and table birds - Health management (culling) • Egg collection	and table birds • Demonstration and practical session on feeding, watering, egg collection, culling and health. management of laying and table birds. • Projects on rearing layers and table birds
6. Digestion in Birds	• Identify the parts of the digestive system of a bird. • Describe the process of digestion in a bird. • Distinguish between the different types of feeds given to poultry.	• Feeding in birds: • Digestive system of a chicken • Process of digestion in a bird • Poultry feeds and feeding	• Observation of the parts of the digestive system of a bird. • Observation of the types of feeds given to birds.
7. Poultry Diseases (new castle,	• Name the causal organisms of	• Poultry diseases: • Identification of sick birds	• Guided discussion of symptoms,

coccidiosis, BWD, typhoid, fowl pox)	major poultry diseases. • Describe the symptoms, prevention and treatment of major poultry diseases.	• Causal organism • Symptoms • Prevention and treatment	prevention and treatment of poultry diseases. • Farm visit to observe signs of sickness in birds.
8. Poultry Parasites (lice, mite, tape worms, round worms)	• Identify poultry parasites • Identify the parts of poultry parasites • Describe the life cycles of poultry parasites • Describe the nature of damage, effect and control of parasites on poultry	• Identification of parasites: - External parasites - Internal parasites - Parts of the parasites • Life cycles of poultry parasites • Nature of damage/ effects and control measures of poultry parasites	• Observation of different poultry parasites and their parts. • Guided discussion of the damage, effects and control of poultry parasites. • Guided discussion on the life cycle of poultry parasites.
9. Vices in Poultry	• Explain the types of vices in poultry houses and their	• Vices in poultry: - Types of vices in poultry; egg eating, toe	• Observation of effect of vices in poultry houses. • Discussion of

	prevention	pecking, feather pecking, cannibalism, vent pecking - Causes of vices in poultry • Preventive measures.	cause, effects and prevention of vices.
10. Egg Processing	• Handle and process eggs properly and prepare them for marketing	• Egg processing: - Egg handling - Egg candling - Cleaning of eggs - Abnormalities in eggs and their causes • Packaging and storage	• Demonstration and practical sessions on handling, candling, packaging and storage of eggs. • Provide space for learners to set up marketing stalls for poultry at appropriate points in school or community to sell their poultry products.
11. Grooming of	• Explain the	• Grooming of birds:	• Discussion on

Birds	purpose of grooming birds. • Groom a bird correctly.	- Purpose • Procedure	the objectives of grooming. • Demonstration and practical session on grooming of birds.
12. Caponisation	• Explain the importance of coponisation. • Explain the methods of caponisation .	• Meaning and importance of caponisation. • Methods of caponisation.	• Discussion on the meaning, objectives and methods of caponisation.

TOPIC 4b: PIG PRODUCTION

GENERAL OBJECTIVE:

To enable the learner apply knowledge and skills in raising pigs profitably

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1. Introduction to Pig Production	• Explain the importance of pig production • Identifying challenges associated with pig	• Introduction to pig production: - Importance - Challenges associated with pig production. - Points of a pig - Breeds and types of	• Brain storming on the importance and problems associated with pig production. • Observation and identification of

	production. • Identify the points of a pig • Distinguish between different breeds of pigs.	pigs.	the points of a pig and the characteristics of different breeds of pigs.
2. Breeding Pigs	• Explain the criteria for selection of pigs for breeding. • Describe the different systems of breeding in pigs. • Describe the reproductive system of a boar and a sow. • Identify the signs of heat, pregnancy and farrowing in pigs. • Care for a pregnant sow.	• Selection of pigs for breeding. • Breeding systems. • Reproduction in pigs: - Reproductive system of a boar and a sow - Signs of heat - Signs of pregnancy - Care of a pregnant sow - Farrowing	• Brainstorming on the criteria for selecting pig breeds. • Guided discussion on the systems of breeding in pigs. • Observation of the reproductive systems, signs of heat and pregnancy in sows. • Practical session on care of pregnant sow and farrowing.

	• Care for pigs when farrowing.		
3. Management of Pigs	• Manage pigs. • Care for pigs when farrowing.	• Housing of pigs. • Management of: i) Sow soon after farrowing ii) Boar iii) Litter / piglets iv) Growers	• Brainstorm on management of pigs. • Projection pig rearing as growers, sows or piglets.
4. Nutrition in Pigs	• Identify different pig feeds • Draw and label the digestive system of a pig.	• Feeds and feeding in pigs -creep feeding. • Digestive system of a pig. •	• Observation and identification of the different types of pig feeds. • Identification of different parts of the digestive system of a pig.
5. Pig Diseases and Parasites	• State causes, symptoms and control measures of pig diseases. • Identify a sick pig by looking at the symptoms • Draw and label	• Pig diseases: - Causal organism - Symptoms - Control measures • Parasites in pigs. - Examples of pig louse, mange, tapeworm, round worm. - Anatomy/structure of parasites.	• Discussion on the symptoms and control of diseases. • Observation and identification of some specimen of pig parasites. • Observe pigs infected by some parasites.

	diagrams of pig parasites. • State the effectiveness of parasites on host animals and identify infected hosts. • Administer drugs of controlling/ treating pig diseases and parasites.	- Life cycle of the parasites. - Effects of parasites on host. • Control / treatment of the parasites.	
6. Record keeping in a Pig Enterprise.	• Keep records in a pig enterprise.	• Records - Importance of keeping records • Type of records	• Provide space for learners to set up marketing stalls for piglets and pig products at appropriate points in the school or community to sell. • Generate records in pig production. • Observe the already prepared pig records in the farm.

			• Participate practically in recording information in the record sheets.

TERM THREE

TOPIC 1: CATTLE PRODUCTION (compulsory)

GENERAL OBJECTIVE:
To enable the learner manage cattle profitably.

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1. Importance of Cattle Keeping.	• Explain the ways in which cattle keeping is important to us.	• Importance of cattle keeping: - Food - Power - Income - Hides and skins - Raw materials for industries	• Discussion on the importance of keeping cattle.
2. Points of Cow/bull.	• Identify the parts of a cow and bull.	• Points of a cow and bull.	• Observing and identifying the points on a cow/bull.
3. Breeds of Cattle.	• Describe the characteristics of the different breeds of cattle kept.	• Purposes of keeping the different breeds of cattle: - Dairy - Beef	• Discussing the purposes for which the different breeds are kept. • Project-on cattle rearing.

		- Dual purposes	
5. Reproduction in Cattle.	• Describe the male and female reproductive system in cattle. • Recognize the signs of heat, pregnancy and calving in a cow. • Management of a pregnant cow.	• Reproduction in cattle: - Male reproductive system. - Female reproductive system. • Signs of heat in females. • Process of fertilization and implantation of the embryo. • Pregnancy (gestation). • Calving (parturition) .	• Observation and description of specimens of the male and female reproductive systems of a cattle. • Observing cows for signs of heat and calving. • Aiding a cow during calving.
6. Cattle Improvement.	• Give reasons for improving cattle. • Describe the methods of improving cattle. • Compare and contrast natural mating and artificial insemination in cattle.	• Cattle improvement: • Reasons for improvement • Methods of improving cattle (selection and breeding) • Hybrid vigor • Artificial	• Discussing the reasons for improving cattle and methods of improvement. • Demonstration of artificial insemination of a cow.

		insemination.	
7. The Digestive system of Cattle	• Describe the parts of the digestive systems and process of digestion of cattle.	• The digestive system of cattle. • Parts of the digestive system of cattle. • Digestion.	• Observation, description and drawing of the parts of the digestive system. • Discussion on the process of digestion in cattle.
8. Feeding and Nutrition in Cattle	• Explain the nutrient requirements of cattle. • Identify the various types of foodstuff given to cattle. • Outline the principles of feeding cattle. • Explain the meaning of the different terms used in animal nutrition.	• Feeding and nutrition in cattle. • Nutrients required by cattle (carbohydrates, proteins, lipids, vitamins, mineral salts). • Feedstuffs fed to cattle (water, roughages, concentrates, supplements). • Principles of feeding cattle (time, amount, economic returns, price of feeds,	• Discussion on the nutrient requirements of cattle. • Observation and description of various feedstuffs. • Discussion of the principles of feeding. • Explanation of the terminologies used in animal nutrition. • Feeding cattle.

		availability of feeds). • Terminologies used in animal nutrition (e.g. starch equivalent, production ration, maintenance ration, crude protein, supplementary feeding, dry matter, roughages, concentrates, digestibility, feeding standards).	
9. Calf Rearing	• Describe and carry out routine practices carried out in calf rearing.	• Calf reading: • -Immediate care after birth • -feeding -dehorning -branding • -castration -housing • -Parasite and disease control	• Farm visits to observe demonstrations of calf rearing practices. • Carrying out calf rearing practices.
10. Other	• Describe while	• Management	• Discussion of the

Cattle Management Practices	giving reasons for e cattle management practices. • Carry out cattle management practices.	practices: - Grazing management - Identification (branding, tattooing, ear notching, ear tagging, belling). - Diseases and parasite control (dipping, spraying, hand picking, pyre greasing, de-worming). • Hoof trimming.	cattle management practices. • Demonstration of the cattle management practices. • Generate records in cattle production. • Provide space for learners to set up marketing stalls for cattle and cattle products at appropriate points in the school or community to sell.
11. Diseases and Parasites in Cattle	• Identify cattle parasites and explain their effects on cattle. • Describe the life cycles of cattle parasites. • Carry out measures to control parasites. • Describe spread, symptoms and	• Meaning of the term parasite. • Cattle parasites; - Endo parasites (liver fluke, tape worms, round worms) - Ecto – parasites	• Brainstorming on the meanings of parasite and disease. • Observation of specimens of parasites and describing them • Observation of cattle to identify effect of parasites on them.

	control measures of cattle diseases. • Carry out measures to control cattle diseases.	(tick, lice, mites, fleas) • Cattle diseases: - Viral diseases - Bacterial diseases - Protozoan diseases • Note: study in detail each of the diseases in relation to causal organism, symptoms, spread and control measures.	• Discussion on the effects, life cycles, and methods of parasite control. • Practicing methods of controlling parasites. • Discussion on the spread of cattle diseases and control measures. • Observation of sick animals to identify diseases affecting them. • Practicing disease control measures. •

TOPIC 2 FARM STRUCTURES (compulsory)

GENERAL OBJECTIVE:

To enable the learner acquire and use the knowledge and skills of construction and maintaining farm structures

SUB TOPIC	SPECIFIC OBJECTIVES The learner should be able to:	CONTENT	TEACHING AND LEARNING STRATEGIES
1. Fencing	• Explain the importance of fencing. • Describe the different types of fences, advantages and disadvantages of each. • Protect fencing poles. • Participate effectively in construction of a barbed wire fence.	• Importance of farm fencing. • Types of fences: • Materials used. • Advantage and disadvantage of different types of fences. • Treatment of fencing poles. • Construction of a barbed wire fence.	• Guided discussion on importance of fences. • Visiting and observing different types of fences. • Practical demonstration of: - Treatment of fencing poles - Constructing a barbed wire fence.
2. Farm Buildings	• Explain qualities of a good building. • Identify the different	• Farm buildings: • Importance • Types • Qualities of a good farm	• Observation of different types of buildings in the school and farm. • Discussion of

	building materials and state advantages and disadvantages of each. • Estimate quantities of building materials. • Select a site for the various farm buildings.	building • Building materials • Part of a farm building (foundation, walls, roof frame) • Factors considered when setting a farm building. • Maintenance of farm buildings.	advantages and disadvantages of building materials. • Discussion on the maintenance of buildings • Observation of building to identify parts • Demonstration and practical session on mixing mortar, concrete; and brick making calculating building materials.
	• Make simple designs of farm buildings. • Explain the possible reasons that may cause building to collapse.	• Simple design of buildings: - Pigsty - Poultry houses - Calf pen - Dairy barn - Farm stores - Maize crib • Causes of collapse of buildings.	• Observation of different types of building designs • Discussion on causes of failure/ collapse of buildings. • Projects on construction of farm buildings.
3. Animal handling Lay-outs	• Explain how animal handling lay outs are used. • Participate in the use of a cattle crush.	• Types of crushes: • Cattle dip • Spray race • Consider the following for each: - Purpose - Design	• Guided discussion of animal handling structures. • Observation of designs of animal handling structures. • Practical

		- Advantages and limitations - How they are used - Maintenance	demonstration of how they are used. • Discussion of the advantages and disadvantages of the different animal handling layout.
4. Farm Water supply	• Explain the importance of water in a farm. • Identify water sources. • Practice water storage. • Treat water for consumption.	• Farm water: - Importance of water on the farm - Sources of farm water: springs, wells, boreholes, rain and piped water. - Water storage: reservoirs, dams, overhead tanks - Maintenance of water storage facilities. - Distribution of water on the farm - Methods of water treatment.	• Discussion of the importance of sources of water on the farm. • Observation of water: - Storage structures - Distribution system on the farm. • Demonstration of methods of water treatment.

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