



REPUBLIC OF KENYA
MINISTRY OF EDUCATION

**SECONDARY SYLLABUS
VOLUME II**

SUBJECTS:
MATHEMATICS, PHYSICS, CHEMISTRY, BIOLOGY, AGRICULTURE
AND HOME SCIENCE



KENYA INSTITUTE OF EDUCATION 2002

MINISTRY OF EDUCATION SCIENCE &
TECHNOLOGY

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AND HOME SCIENCE

KENYA INSTITUTE OF EDUCATION
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This new secondary syllabus replaces the original 8-4-4- education syllabus which was first introduced in 1986 and revised in 1992. It is available in four volumes.

Volume one contains English, Kiswahili, Arabic, French, German and Physical Education.
Volume two contains Mathematics, Physics, Chemistry, Biology, Agriculture and Home Science. **Volume three** contains History and Government, Geography, Business Studies, Christian Religious Education, Islamic Religious Education and Hindu Religious Education.
Volume Four contains Arts & Design, Computer Studies and Music.

In each syllabus the objectives have been more clearly defined and the content spelt out more specifically to give better guidance to the users.

The issue of overload in the secondary curriculum has been addressed by a reduction in the number of subjects and content in the different subject areas. The reorganization of the syllabuses has been done in such a way that better mastery of the knowledge, skills and attitudes required at the end of the secondary cycle is ensured.

The reorganisation has also tried to ensure that the cost of education on the part of both the Government and households will be significantly reduced. Careful consideration has been given to the resources required to implement this curriculum in order to make the cost manageable. Most of the resources can either be improvised, obtained locally or acquired at fairly low costs.

A special feature of the revised curriculum is the deliberate attempt to respond to the contemporary needs of society. This has been done by the inclusion of such emerging issues as health, environmental and civic education, gender and the anticipated industrial transformation of the nation.

In this rationalization most of the Technical and Industrial subjects have been moved to training institutions. Essential competencies earlier acquired through the Business Education subjects will be taught in the new integrated Business Studies subject.

The teaching of English and Kiswahili will remain integrated. The revised syllabuses have clearly defined the integrated approach to make the teaching of the languages more effective.

NAOMY W. WANGAI
Director of Education

NATIONAL GOALS OF EDUCATION

Education in Kenya should:

1. foster nationalism, patriotism and promote national unity

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

2. promote the social, economic, technological and industrial needs for national development

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

a) Social Needs

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

b) Economic Needs

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

c) Technological and Industrial Needs

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

4. promote sound moral and religious values

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

5. promote social equality and responsibility

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

6. promote respect for and development of Kenya's rich and varied cultures

Education should instil in the youth of Kenya an understanding of past and present cultures and their valid place in contemporary society. The children should be able to blend the best of traditional values with the changed requirements that must follow rapid development in order to build a stable and modern society.

7. promote international consciousness and foster positive attitudes towards other nations

Kenya is part of the international community. It is part of the complicated and interdependent network of peoples and nations. Education should therefore lead the youth of the country to accept membership in this international community with all the obligations and responsibilities, rights and benefits that this membership entails.

8. promote positive attitudes towards good health and environmental protection

Education should inculcate in the youth the value for good health in order to avoid indulging in activities that will lead to physical or mental ill health. It should foster positive attitudes towards environmental development and conservation. It should lead the youth to appreciate the need for a healthy environment.

3. promote individual development and self-fulfillment

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

OBJECTIVES OF SECONDARY EDUCATION

Secondary Education should provide the learner with opportunities to:

1. acquire necessary knowledge, skills and attitudes for the development of the self and the nation
2. promote love for and loyalty to the nation
3. promote harmonious co-existence among the peoples of Kenya
4. develop mentally, socially, morally, physically and spiritually
5. enhance understanding and respect for own and other people's cultures and their place in contemporary society
6. enhance understanding and appreciation of inter-relationships among nations
7. promote positive environmental and health practices
8. build a firm foundation for further education and training
9. develop ability for enquiry, critical thinking and rational judgement
10. develop into a responsible and socially well adjusted person
11. promote acceptance of and respect for all persons
12. enhance enjoyment in learning
13. identify individual talents and develop them
14. build a foundation for technological and industrial development
15. develop into a self-disciplined individual who appreciates work and manages time properly.

MATHEMATICS

INTRODUCTION

Secondary Mathematics aims at producing a person who will be numerate, orderly, logical, accurate and precise in thought. The person should also be competent in appraising and utilizing mathematical skills in playing a positive role in the development of a modern society.

In preparing this course care has been taken to ensure not only continuity, but also the reinforcement and broadening of the basic skills already established in the eight years of primary education. While greater emphasis has been placed in the needs of learners who will leave the normal education at the end of the four year secondary cycle, the course will also prepare learners who will pursue further studies in the subject and other related courses.

This syllabus has been reorganized and streamlined to remove overloads in the content and overlaps of certain content evident in the previous Mathematics syllabus. Effort has been made to bridge the gap between Primary and Secondary Mathematics.

The syllabus has emphasized application of Mathematics to real life experiences and practical approaches to teaching and learning in an effort to address such contemporary issues as information technology, health, gender and integrity. However, apart from the use of calculators which has been introduced in the course, as a technological device most of the other issues will be addressed by way of examples and exercises in support materials.

The objectives of teaching Mathematics have been expanded to enhance clarity. In addition notes have been included with the aim of not only assisting in the interpretation of the syllabus, but also to alert the teacher on some precautions required in handling the different topics. Also included in the notes are suggested resources and further assessment. Time for each topic have been suggested.

The course has been designed to enable the learner to acquire attitudes, knowledge and skills which will be relevant to his/her life after school. It is also expected to enable the learner to foster a positive attitude towards Mathematics appreciating its usefulness and relevance to a modern society.

GENERAL OBJECTIVES

By the end of the course, the learner should be able to:

1. develop a positive attitude towards learning Mathematics
2. perform mathematical operations and manipulations with confidence, speed and accuracy
3. think and reason precisely, logically and critically in any given situation
4. develop investigative skills in Mathematics
5. identify, concretise, symbolise and use Mathematical relationships in everyday life
6. comprehend, analyse, synthesise evaluate and make generalizations so as to solve mathematical problems
7. collect, organise, represent, analyse, interpret data and make conclusions and predictions from its results
8. apply mathematical knowledge and skills to familiar and unfamiliar situations
9. appreciate the role, value and use of Mathematics in society
10. develop a willingness to work collaboratively
11. acquire knowledge and skills for further education and training
12. communicate mathematical ideas

Symbols:

The use of SI units will be applied throughout the syllabus. Besides the usual operational symbols $+$, $-$, \times , \div , the combined \pm will also be used.

Rational symbols

=	is equal to.
\neq	is not equal to.
>	is greater than.
\geq	is greater than or equal to
<	is less than.
\leq	is less than or equal to.
a:b	ratio of a to b.
α	Varies as.
\equiv	is congruent to or is identical to.
\approx	is approximately equal to.

FORM ONE

<p>1.0.0 NATURAL NUMBERS (4 Lessons)</p> <p>1.1.0 Specific Objectives By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) identify, read and write natural numbers in symbols and words b) round off numbers to the nearest tens, hundreds, thousands, millions and billions c) classify natural numbers as even, odd or prime d) solve word problems involving natural numbers. 	<p>2.0.0 FACTORS (4 lessons)</p> <p>2.1.0 Specific Objectives By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) express composite numbers in factor form b) express numbers as product of prime factors c) express factors in power form. 	<p>4.0.0 GREATEST COMMON DIVISOR(GCD) / HIGHEST COMMON FACTOR (HCF) (4 lessons)</p> <p>4.1.0 Specific Objectives By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) find the GCD/HCF of a set of numbers b) apply GCD to real life situations. 	<p>4.2.0 Content</p> <ul style="list-style-type: none"> 4.2.1 Greatest common divisor of a set of numbers 4.2.2 Application of GCD/HCF to real life situations 	<p>Notes</p> <ul style="list-style-type: none"> ▪ Use of “index” for “power” is discouraged at this stage. ▪ <u>Suggested Resources</u> Charts to illustrate factorisation e.g. factor tree diagrams. ▪ <u>Suggested Further Assessment</u> - puzzles and games 	<p>5.0.0 LEAST COMMON MULTIPLE (L.C.M.) (5 Lessons)</p> <p>5.1.0 Specific Objectives By the end of the topic, the learner should be able to test the divisibility of numbers by 2, 3, 4, 5, 6, 8, 9, 10 and 11</p>	<p>5.2.0 Content</p> <ul style="list-style-type: none"> 5.2.1 Divisibility test of numbers by 2, 3, 4, 5, 6, 8, 9, 10, and 11 	<p>Notes</p> <ul style="list-style-type: none"> ▪ Include reading and writing large numbers - millions and billions ▪ Use word problems to involve the four basic operations ▪ Reinforce the idea of place value and total value of natural numbers. ▪ <u>Suggested Resources</u> - Place value charts - The abacus ▪ Bank Cheques and Statements
<p>1.2.0 Content</p> <ul style="list-style-type: none"> 1.2.1 Place values of numbers 1.2.2 Round off numbers to the nearest tens, hundreds, thousands, millions and billions 1.2.3 Odd numbers 1.2.4 Even numbers 1.2.5 Prime numbers 1.2.6 Word problems involving natural numbers 	<p>3.0.0 DIVISIBILITY TESTS</p> <p>3.1.0 Specific Objectives By the end of the topic, the learner should be able to test the divisibility of numbers by 2, 3, 4, 5, 6, 8, 9, 10 and 11</p>	<p>4.3.0 Specific Objectives By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) list multiples of numbers b) find the least common multiple of a set of numbers c) apply knowledge of LCM in real life situations. 	<p>5.3.0 Content</p> <ul style="list-style-type: none"> 5.3.1 Multiples of a number 5.3.2 LCM of a set of numbers 5.3.3 Application of LCM in real life situations 	<p>Notes</p> <ul style="list-style-type: none"> ▪ Use word problems to involve the four basic operations ▪ Reinforce the idea of place value and total value of natural numbers. ▪ <u>Suggested Resources</u> - Puzzles and games 	<p>5.4.0 Content</p> <ul style="list-style-type: none"> 5.4.1 Multiples of a number 5.4.2 LCM of a set of numbers 5.4.3 Application of LCM in real life situations 	<p>Notes</p> <ul style="list-style-type: none"> ▪ Practical exercises are encouraged ▪ More practice required on directed numbers especially when subtracting negative integers ▪ Explain the term directed numbers. 	<p>Suggested Resources</p> <ul style="list-style-type: none"> - the number line - stairways - ladder - thermometer - real life situations
<p>1.3.0 Content</p> <ul style="list-style-type: none"> 1.3.1 Place value of numbers 1.3.2 Round off numbers to the nearest tens, hundreds, thousands, millions and billions 1.3.3 Odd numbers 1.3.4 Even numbers 1.3.5 Prime numbers 1.3.6 Word problems involving natural numbers 	<p>3.2.0 Specific Objectives By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) list multiples of numbers b) find the least common multiple of a set of numbers c) apply knowledge of LCM in real life situations. 	<p>4.4.0 Content</p> <ul style="list-style-type: none"> 4.4.1 Multiples of a number 4.4.2 LCM of a set of numbers 4.4.3 Application of LCM in real life situations 	<p>5.5.0 Content</p> <ul style="list-style-type: none"> 5.5.1 Multiples of a number 5.5.2 LCM of a set of numbers 5.5.3 Application of LCM in real life situations 	<p>Notes</p> <ul style="list-style-type: none"> ▪ Practical exercises are encouraged ▪ More practice required on directed numbers especially when subtracting negative integers ▪ Explain the term directed numbers. 	<p>Suggested Resources</p> <ul style="list-style-type: none"> - the number line - stairways - ladder - thermometer - real life situations 	<p>Notes</p> <ul style="list-style-type: none"> ▪ Practical exercises are encouraged ▪ More practice required on directed numbers especially when subtracting negative integers ▪ Explain the term directed numbers. 	<p>Suggested Resources</p> <ul style="list-style-type: none"> - the number line - stairways - ladder - thermometer - real life situations
<p>1.4.0 Content</p> <ul style="list-style-type: none"> 1.4.1 Place value of numbers 1.4.2 Round off numbers to the nearest tens, hundreds, thousands, millions and billions 1.4.3 Odd numbers 1.4.4 Even numbers 1.4.5 Prime numbers 1.4.6 Word problems involving natural numbers 	<p>3.3.0 Specific Objectives By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) list multiples of numbers b) find the least common multiple of a set of numbers c) apply knowledge of LCM in real life situations. 	<p>4.5.0 Content</p> <ul style="list-style-type: none"> 4.5.1 Multiples of a number 4.5.2 LCM of a set of numbers 4.5.3 Application of LCM in real life situations 	<p>5.6.0 Content</p> <ul style="list-style-type: none"> 5.6.1 Multiples of a number 5.6.2 LCM of a set of numbers 5.6.3 Application of LCM in real life situations 	<p>Notes</p> <ul style="list-style-type: none"> ▪ Practical exercises are encouraged ▪ More practice required on directed numbers especially when subtracting negative integers ▪ Explain the term directed numbers. 	<p>Suggested Resources</p> <ul style="list-style-type: none"> - the number line - stairways - ladder - thermometer - real life situations 	<p>Notes</p> <ul style="list-style-type: none"> ▪ Practical exercises are encouraged ▪ More practice required on directed numbers especially when subtracting negative integers ▪ Explain the term directed numbers. 	<p>Suggested Resources</p> <ul style="list-style-type: none"> - the number line - stairways - ladder - thermometer - real life situations

		<ul style="list-style-type: none"> Suggested Further Assessment <ul style="list-style-type: none"> - Short test on 6.0.0 - Puzzles and games - Short test on 9.0.0
7.0.0 FRACTIONS (12 lessons)	8.0.0 DECIMALS (12 Lessons)	<ul style="list-style-type: none"> Real life situations
7.1.0 Specific Objectives	8.1.0 Specific Objectives	<p>By the end of the topic, the learner should be able to:</p> <ol style="list-style-type: none"> identify proper and improper fractions and mixed numbers convert mixed numbers to improper fractions and vice versa compare fractions perform the four basic operations on fractions carry out combined operations on fractions in the correct order apply the knowledge of fractions to real life situations.
Content	Content	<p>By the end of the topic, the learner should be able to:</p> <ol style="list-style-type: none"> convert fractions into decimals round off a decimal number to the required number of decimal places write numbers in standard form perform the four basic operations on decimals carry out operations in the correct order apply the knowledge of decimals to real life situations.
7.2.0 Fractions	8.2.0 Content	<p>Treat fractions with positive and negative cases in the same way as integers or as directed numbers.</p>
7.2.1 Proper, improper fractions and mixed numbers	8.2.1 Fractions and decimals	<ul style="list-style-type: none"> Give emphasis and time to the correct order of operations. Use of real objects is encouraged Include equivalent fractions
7.2.2 Conversion of improper fractions to mixed numbers and vice versa	8.2.2 Recurring decimals	<ul style="list-style-type: none"> Chart illustrating operations on fractions and equivalent fractions
7.2.3 Comparing fractions	8.2.3 Standard form	<p>Notes</p> <ul style="list-style-type: none"> Treat fractions with positive and negative cases in the same way as integers or as directed numbers. Give emphasis and time to the correct order of operations. Use of real objects is encouraged Include equivalent fractions Chart illustrating operations on fractions and equivalent fractions
7.2.4 Operations on fractions	8.2.4 Decimal places	
7.2.5 Order of operations on fractions	8.2.5 Operations on decimals	
7.2.6 Word problems involving fractions in real life situations	8.2.6 Order of operations	
7.2.7	8.2.8 Real life problems involving decimals	
		<p>Notes</p> <ul style="list-style-type: none"> Explain the recurring decimal notation of the form; $6.\overline{3} = (6.33\dots)$ $6.\overline{34} = (6.3434\dots)$ $6.\overline{344} = (6.3444\dots)$ $6.\overline{345} = (6.345345\dots)$
		<p>Notes</p> <ul style="list-style-type: none"> Use four figure mathematical tables. When finding the square roots of a number, the number should be written in the form $A \times 10^n$ where $1 \leq A < 100$ and n is an even integer.
		<p>Suggested Resources</p> <ul style="list-style-type: none"> Real life experiences
		<p>Suggested Further Assessment</p>

	<ul style="list-style-type: none"> - Short test on algebra - Puzzles and games 	
11.0.0 RATES, RATIO, PERCENTAGES AND PROPORTION (18 Lessons)		
11.1.0 Specific Objectives	<p>By the end of the topic, the learner should be able to:</p> <ol style="list-style-type: none"> define rates solve problems involving rates define ratio compare two or more quantities using ratios change quantities in a given ratio compare two or more ratios represent and interpret proportional parts recognise direct and inverse proportions solve problems involving direct and inverse proportions convert fractions and decimals to percentages and vice-vers calculate percentage change in a given quantity apply rates, ratio, percentage to real life situations. 	
	<p>Suggested resources</p> <ul style="list-style-type: none"> - Real life situations involving quantities, shares, sharing etc. <p>Suggested further assessment</p> <ul style="list-style-type: none"> - Test on topics 9.0.0 and 10.0.0 can be given here 	
11.2.0 Content	<ol style="list-style-type: none"> Units of length Conversion of units of length from one form to another Significant figures Perimeter Circumference (include length of arcs) 	
11.2.1 Rates	11.2.1 Units of length	
11.2.2 Solving problems involving rates	11.2.2 Conversion of units of length from one form to another	
11.2.3 Ratio	11.2.3 Significant figures	
11.2.4 Comparing quantities using ratio	11.2.4 Perimeter	
11.2.5 Increase and decrease in a given ratio	11.2.5 Circumference (include length of arcs)	
11.2.6 Comparing ratios		
11.2.7 Proportion: direct and inverse.	11.2.7 Solve problems involving direct and inverse proportions.	
11.2.8 Fractions and decimals as percentages	11.2.8 Fractions and decimals as percentages	
11.3.10 Percentage increase and decrease	11.3.10 Percentage increase and decrease	
11.3.11 Application of rates, ratios, percentages and proportion to real life situations	11.3.11 Application of rates, ratios, percentages and proportion to real life situations	
	<p>Notes</p> <ul style="list-style-type: none"> - Encourage practical approach to establish the value of π and the relationship $C = \pi D$ or $C=2\pi r$ include lengths of arcs taken as fractions of circumference <p>Suggested Resources</p> <ul style="list-style-type: none"> - Measuring instrument e.g. Metre rule, vernier 	

	<ul style="list-style-type: none"> - callipers, micrometer screw gauge, tape measure etc - Environment 	
	<p>Suggested Further Assessment</p> <ul style="list-style-type: none"> - Practical exercises in the process of deriving formulae for areas. 	
11.0.0 VOLUME AND CAPACITY (6 Lessons)		
11.0.1 Specific Objectives	<p>By the end of the topic the learner should be able to:</p> <ol style="list-style-type: none"> state units of volume convert units of volume from one form to another calculate volume of cubes, cuboids and cylinders state units of capacity convert units of capacity from one form to another relate volume to capacity solve problems involving volume and capacity. 	
11.1.0 Content	<ol style="list-style-type: none"> Volume of cube, cuboid and cylinder Volume of area Conversion of units of area Area of regular plane figures Area of irregular plane shapes Surface area of cube, cuboid and cylinder Units of area Conversion of units of area Area of regular plane figures Area of irregular plane shapes Surface area of cube, cuboid and cylinder Units of capacity Conversion of units of capacity Relationship between volume and capacity Solving problems involving volume and capacity 	
11.2.0 Content	<ol style="list-style-type: none"> Deriving area of circle practically using very small sectors is required. Include "ares" and "hectares" Derive surface area of cylinders. Include combined areas of shapes Include conversion of cm^2 to m^2 etc. Derive surface area of cylinders. Include combined areas of shapes Include conversion of cm^3 to m^3 etc. 	
11.2.1 Units of length	11.2.1 Units of length	
11.2.2 Conversion of units of length from one form to another	11.2.2 Conversion of units of length from one form to another	
11.2.3 Significant figures	11.2.3 Significant figures	
11.2.4 Perimeter	11.2.4 Perimeter	
11.2.5 Circumference (include length of arcs)	11.2.5 Circumference (include length of arcs)	
11.2.6 Comparing ratios		
11.2.7 Proportion: direct and inverse.	11.2.7 Solve problems involving direct and inverse proportions.	
11.2.8 Fractions and decimals as percentages	11.2.8 Fractions and decimals as percentages	
11.3.10 Percentage increase and decrease	11.3.10 Percentage increase and decrease	
11.3.11 Application of rates, ratios, percentages and proportion to real life situations	11.3.11 Application of rates, ratios, percentages and proportion to real life situations	
	<p>Notes</p> <ul style="list-style-type: none"> - Encourage practical approach to establish the value of π and the relationship $C = \pi D$ or $C=2\pi r$ include lengths of arcs taken as fractions of circumference <p>Suggested Resources</p> <ul style="list-style-type: none"> - Model of cube, cuboid and cylinder - Charts illustrating regular plane figures 	

16.0.0	TIME (4 Lessons)	16.0.0	Suggested Further Assessment	<ul style="list-style-type: none"> - Practical exercises. - Short test on volume
15.0.0	MASS, DENSITY AND WEIGHT (4 LESSONS)	16.1.0	Specific Objectives	By the end of the topic, the learner should be able to: <ul style="list-style-type: none"> a) convert units of time from one form to another b) relate the 12 hour and 24 hour clock systems c) read and interpret travel time-tables d) solve problems involving travel time tables
15.1.0	Specific Objectives	16.2.0	Content	<p>16.2.0</p> <ul style="list-style-type: none"> convert units of mass from one form to another define weight state units of weight distinguish mass and weight relate volume, mass and density.
15.2.0	Content	16.2.0	Notes	<p>16.2.0</p> <ul style="list-style-type: none"> Actual travel time-tables should be used Include speed and distance Mention distance and fare tables
15.2.1	Mass and units of mass	16.2.1	Suggested Resources	<ul style="list-style-type: none"> Charts illustrating conversion of time from one system to another Clocks and watches Travel time table charts for buses, trains, ships and aeroplanes
15.2.2	Density	16.2.2	Assessments	<ul style="list-style-type: none"> Test on topics 16.0.0 and 17.0.0 can be given at this stage
15.2.3	Problem solving involving real life experiences on mass, volume and density and weight	16.2.3	Assessments	<ul style="list-style-type: none"> Test on topics 11.0.0 - 15.0.0 can be given at this stage
15.2.4	Weight and units of weight	16.2.4	Assessments	<ul style="list-style-type: none"> Test on topics 11.0.0 - 15.0.0 can be given at this stage
15.2.5	Mass and weight	16.2.5	Assessments	<ul style="list-style-type: none"> Test on topics 11.0.0 - 15.0.0 can be given at this stage

16.0.0	TIME (4 Lessons)	18.2.0	Content	<ul style="list-style-type: none"> b) solve simultaneous linear equations by substitution and elimination c) form and solve linear equations in one and two unknowns.
15.0.0	MASS, DENSITY AND WEIGHT (4 LESSONS)	18.2.1	Notes	<ul style="list-style-type: none"> Include currency exchange rate and buying and selling tables.
15.1.0	Specific Objectives	18.2.2	Notes	<ul style="list-style-type: none"> Knowledge of change and balances in purchases is assumed. However, problems involving change and balances should be given.
15.2.0	Content	18.2.3	Notes	<ul style="list-style-type: none"> Actual current exchange rate table from newspapers etc - Beam balances - Real life situations and experiences
15.2.1	Mass and units of mass	18.2.4	Suggested Resources	<ul style="list-style-type: none"> Actual current exchange rate table from newspapers etc - puzzles and games - Test on topics 16.0.0 and 17.0.0 can be given here
15.2.2	Density	18.2.5	Assessments	<ul style="list-style-type: none"> Actual current exchange rate table from newspapers etc - puzzles and games - Test on topics 16.0.0 and 17.0.0 can be given here
15.2.3	Problem solving involving real life experiences on mass, volume and density and weight	18.2.6	Assessments	<ul style="list-style-type: none"> Actual current exchange rate table from newspapers etc - puzzles and games - Test on topics 16.0.0 and 17.0.0 can be given here
15.2.4	Weight and units of weight	18.2.7	Assessments	<ul style="list-style-type: none"> Actual current exchange rate table from newspapers etc - puzzles and games - Test on topics 16.0.0 and 17.0.0 can be given here
15.2.5	Mass and weight	18.2.7	Assessments	<ul style="list-style-type: none"> Actual current exchange rate table from newspapers etc - puzzles and games - Test on topics 16.0.0 and 17.0.0 can be given here

19.2.0	Content	20.2.0 Content
19.2.1	Cartesian plane	20.2.1 types of angles
19.2.2	Cartesian co-ordinates	20.2.2 angles on a straight line
19.2.3	Points on the cartesian plane	20.2.3 angles at a point
19.2.4	Choice of appropriate scale	20.2.4 angles on a transversal
19.2.5	Table of values for a given linear relation	20.2.5 corresponding angles
19.2.6	Linear graphs	20.2.6 angle properties of polygons
19.2.7	Graphical solutions of simultaneous linear equations	20.2.7 application to real life situations
19.2.8	Interpretation of graphs	Notes <ul style="list-style-type: none"> ■ Include exterior angles of a polygon ■ Include the formula for finding the sum of interior angles of a polygon i.e. $\text{sum} = 2(n-2)$ right angles or $180(n-2)$, where n is the number of sides. This formula should be derived. ■ Suggested Resources <ul style="list-style-type: none"> - Geometrical instruments - Polygonal shapes ■ Suggested Further Assessment <ul style="list-style-type: none"> - Test on Topics 18.0.0 and 19.0.0 can be given here
20.0.0	ANGLES AND PLANE FIGURES (6 Lessons)	20.0.0 ANGLES AND PLANE FIGURES (6 Lessons)
20.1.0	Specific Objectives	21.0.0 Specific Objectives
	By the end of the topic, the learner should be able to:	By the end of the topic, the learner should be able to:
a)	name and identify types of angles	a) use a ruler and compasses only to construct
b)	solve problems involving angles on a straight line	i) a perpendicular bisector of a line
c)	solve problems involving angles at a point	ii) an angle bisector
d)	solve problems involving angles on a transversal	iii) a perpendicular to a line from a given point
e)	solve problems involving corresponding angles	iv) a perpendicular to a line through a given point on the line
f)	state angle properties of polygons	v) angles whose values are multiples of $7\frac{1}{2}^\circ$
g)	solve problems involving angle properties of polygons	vi) parallel lines
h)	apply the knowledge of angle properties to real life situations.	b) use a ruler and a set square to;

i)	construct parallel lines	d) state the bearing of one point from another
ii)	divide a line proportionally	e) locate a point using bearing and distance
iii)	construct perpendicular lines	f) determine angles of elevation and depression
c)	construct a regular polygon using	g) solve problems involving bearings, elevations and scale drawing
i)	ruler and compasses only	h) apply scale drawing in simple surveying.
ii)	ruler, compasses and protractor	
d)	construct irregular polygons using a ruler, compasses and protractor	
		Content
		22.2.0 Types of scales
		22.2.1 Choice of scales
		22.2.3 Sketches from given information and scale drawing.
		Bearings
		22.2.4 Bearings, distance and locating points
		22.2.5 Bearings, distance and locating points
		Angles of elevation and depression
		22.2.6 Solving problems involving bearings, scale drawing, angles of elevation and depression
		22.2.7 Simple surveying techniques
		22.2.8
		Notes
		■ Accuracy to be emphasised
		■ Should include true and compass bearings
		■ Include problems involving a combination of bearings, angles of elevation and depression and scale drawing
		Suggested Resources
		- geometrical instruments, clinometer
		- magnetic compass
		- metre rule
		- tape measure
		Suggested Further Assessment
		- Practical exercises
		- Short test on 20.0.0
		22.0.0 SCALE DRAWING (18 Lessons)
		22.1.0 Specific Objectives
		By the end of the topic, the learner should be able to:
		a) interpret a given scale;
		b) choose and use an appropriate scale
		c) draw suitable sketches from given information

23.0.0	COMMON SOLIDS (18 Lessons)	<p>23.2.4 Models of solids from nets</p> <p>23.2.5 Surface area of solids from nets (include cubes, cuboids, cones, pyramids, prisms)</p> <p>23.2.6 Distance between two points on the surface of a solid</p>
23.1.0	Specific Objectives By the end of the topic, the learner should be able to:	<p>a) identify and sketch common solids</p> <p>b) sketch and accurately draw nets of solids</p> <p>c) make models of solids from nets</p> <p>d) calculate surface area of solids from nets</p> <p>e) find distance between two points on a solid.</p>

Content

- 23.2.1 Common solids, eg cubes, cuboids, pyramids, prisms, cones, spheres, cylinders etc.
- 23.2.2 Sketches of solids
- 23.2.3 Nets of solids

23.0.0

- 23.2.4 Models of solids from nets
- 23.2.5 Surface area of solids from nets
(include cubes, cuboids, cones, pyramids, prisms)
- 23.2.6 Distance between two points on the surface of a solid

Notes

- Use and making of models is recommended.

Suggested Resources

- Geometrical instruments
- Manila papers
- Models of solids

Suggested Further

- Practical exercises
- Test on topics 20.0.0 to 23.0.0 may be given here

Assessment

- Short test on 24.2.0

FORM TWO

24.0.0 CUBES AND CUBE ROOTS **(4 Lessons)**

24.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) find the cube of a number by multiplication
- b) find the cube root of a number by factor method
- c) find cubes of numbers from mathematical tables
- d) evaluate expressions involving cubes and cube roots
- e) apply the knowledge of cubes and cube roots in real life situations.

24.2.0 Content

- 24.2.1 Cubes of numbers by multiplication

- 24.2.2 Cubes from tables

- 24.2.3 Cube roots of numbers by factor method

- 24.2.4 Evaluation of cube and cube root expressions

- 24.2.5 Application of cubes and cube roots to real life situations

Notes

- Cube roots should be found by using factor method first before using tables

Suggested Resources

- Mathematical tables
- Real life situations

Suggested Further

- Short test on 24.20

Assessment

- short test on 25.0.0

25.2.0 Content

- 25.2.1 Reciprocals of numbers from tables

- 25.2.2 Reciprocals of numbers from computation using reciprocals

Notes

- Decimal numbers should be converted to standard form before finding their reciprocals using tables.
- Suggested Resources
- Mathematical tables
- Suggested Further

Assessment

- short test on 25.0.0

26.0.0 INDICES AND LOGARITHMS **(18 Lessons)**

26.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) define indices (powers);
- b) state the laws of indices;
- c) apply the laws of indices in calculations;
- d) relate the powers of 10 to common logarithms;
- e) use the tables of common logarithms and anti-logarithms in computation.

Notes

- Cube roots should be found by using factor method first before using tables

Suggested Resources

- Mathematical tables

Suggested Further

- Short test on 24.20

Assessment

- short test on 25.0.0

25.0.0 RECIPROCALS (7 Lessons)

25.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) find reciprocals of numbers by division

- 26.2.5 Logarithm tables
 26.2.6 Application of common logarithms in multiplication, division and finding roots

Notes

- Introduce laws using integral indices.
- Laws of indices should include

$$- a^m \times a^n = a^{m+n}$$

$$- a^m \div a^n = a^{m-n}$$

$$- (a^m)^n = a^{mn}$$

$$- a^0 = 1$$

$$- \frac{1}{a^m} = a^{-m}$$

$$\frac{a^m}{a^n} = \sqrt[m]{a^m}$$

$$- a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

Suggested Resources

Logarithm tables.

Charts illustrating laws of indices

Suggested Further Assessment

- Test on 24.0.0, 25.0.0,
- 26.0.0

- h) state the relationship of gradients of perpendicular lines
 i) state the relationship of gradients of parallel lines
 j) apply the relationship of gradients of perpendicular and parallel lines to get equations of straight lines.

27.2.0 Content

Gradient of a straight line

Equation of a straight line

27.2.2 The equation of a straight line of the form $y = mx + c$

27.2.4 The x and y intercepts of a line

27.2.5 The graph of a straight line

Perpendicular lines and their gradients

Parallel lines and their gradients

27.2.7 Equations of parallel and perpendicular lines.

Notes

- Square boards, graph books, straight edges,rulers, real life situations

Suggested Further Assessment

- Short test on 27.0.0

27.0.0 EQUATIONS OF STRAIGHT LINES (12 Lessons)

27.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) define gradient of a straight line
- b) determine the gradient of a straight line through known points
- c) determine the equation of a straight line using gradient and one known point
- d) express a straight line equation in the form $y = mx + c$
- e) interpret the equation $y = mx + c$
- f) find the x- and y- intercepts from an equation of a line
- g) draw the graph of a straight line using gradient and y-intercept

- h) state the relationship of gradients of perpendicular lines

- i) state the relationship of gradients of parallel lines

- j) apply the relationship of gradients of perpendicular and parallel lines to get equations of straight lines.

28.2.0 Content

- 28.2.1 Lines and planes of symmetry
- 28.2.2 mirror lines and construction of objects and images.
- 28.2.3 reflection as a transformation.
- 28.2.4 reflection in the Cartesian plane.
- 28.2.5 direct and opposite congruency.
- 28.2.6 Congruency tests (SSS, SAS, AAS, ASA and RHS)

Notes

- Practical aspects should be used as much as possible
- ASS does not prove triangles congruent except when the triangles are right angled
- Images are oppositely congruent to their objects under reflection
- Mirrors, Cartesian plane, various symmetrical objects, tracing and graph papers, real life experiences

Suggested Further Assessment

- Practical exercises, tracing

Assessment

- Short test on 29.1.2

29.2.0 Content

- 29.2.1 Properties of rotation
- 29.2.2 Centre and angle of rotation
- 29.2.3 Rotation in the Cartesian plane
- 29.2.4 Rotational symmetry of plane figures and solids (point, axis and order)

Notes

- Encourage practical work
- Emphasise that images are directly congruent to their objects under rotation
- Square boards, graph papers geometrical instruments, tracing paper and real life situations

Suggested Further Assessment

- Practical exercises, tracing

Assessment

- Short test on 29.1.2

29.2.5 Content

- 29.2.1 Congruence and rotation

Notes

- Practical aspects should be used as much as possible
- ASS does not prove triangles congruent except when the triangles are right angled
- Images are oppositely congruent to their objects under reflection
- Mirrors, Cartesian plane, various symmetrical objects, tracing and graph papers, real life experiences

Suggested Further Assessment

- Practical exercises, tracing

Assessment

- Short test on 29.1.2

30.0.0 SIMILARITY AND ENLARGEMENT (19 Lessons)

- 30.0.1 Similarity

Specific Objectives

- By the end of the topic, the learner should be able to:
- a) identify similar figures
- b) construct similar figures
- c) state properties of enlargement as a transformation
- d) apply the properties of enlargement to construct objects and images
- e) apply enlargement in Cartesian planes
- f) state the relationship between linear, area and volume scale factors
- g) apply the scale factors to real life situations.

Suggested Further Assessment

- Practical exercises using mirrors and constructions

Assessment

- Short test on 28.0.0

29.0.0 ROTATION (12 Lessons)

- 29.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) state properties of rotation as a transformation
- b) determine centre and angle of rotation
- c) apply properties of rotation in the Cartesian plane
- d) identify point of rotational symmetry
- e) state order of rotational symmetry of a plane figure
- f) identify axis of rotational symmetry of a solid
- g) state order of rotational symmetry of a solid

Suggested Further Assessment

- Practical exercises using reflection

Assessment

- Short test on 27.0.0

28.0.0 REFLECTION AND CONGRUENCE (12 Lessons)

- 28.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) state the properties of reflection in construction and identification of images and objects
- b) use the properties of reflection in construction and identification of images and objects
- c) make geometrical deductions using reflection
- d) apply reflection in the Cartesian plane
- e) distinguish between direct and opposite congruence
- f) identify congruent triangles.

30.2.0 Content	
30.2.1 Similar figures and their properties	
30.2.2 Construction of similar figures	
30.2.3 Properties of enlargement	
30.2.4 Construction of objects and images under enlargement.	
30.2.5 Enlargement in the Cartesian plane.	
30.2.6 Linear, area and volume scale factors	
30.2.7 Real life situations	
Notes	
▪ Suggested Resources	Square boards, tape measures and metre rules
▪ Suggested Further Assessment	- Practical exercises - Quiz
32.0.0 TRIGONOMETRY (19 Lessons)	
32.1.0 Specific Objectives	By the end of the topic, the learner should be able to:
a) define tangent, sine and cosine ratios from a right angled triangle	
b) read and use tables of trigonometric ratios	
c) use sine, cosine and tangent in calculating lengths and angles	
d) establish and use the relationship of sine and cosine of complimentary angles	
e) relate the three trigonometric ratios	
f) determine the trigonometric ratios of special angles 30° , 45° , 60° and 90° without using tables	
g) read and use tables of logarithms of sine, cosine and tangent	
h) apply the knowledge of trigonometry to real life situations.	
31.1.0 PYTHAGORAS THEOREM (4 Lessons)	
31.1.0 Specific Objectives	By the end of the topic, the learner should be able to:
a) derive Pythagoras Theorem	
b) solve problems using Pythagoras Theorem	
c) apply Pythagoras Theorem to real life situations.	
31.2.0 Content	
31.2.1 Pythagoras Theorem	
31.2.2 Solution of problems using Pythagoras Theorem	
31.2.3 Application to real life situations	
Notes	
▪ Use square cuttings to verify Pythagoras Theorem.	
34.0.0 AREA OF QUADRILATERALS AND OTHER POLYGONS (4 Lessons)	
34.1.0 Specific Objectives	By the end of the topic, the learner should be able to:
a) find the area of a quadrilateral	
b) find the area of other polygons (regular and irregular).	
Content	
34.2.0 Content	
34.2.1 Area of quadrilaterals.	
34.2.2 Area of other polygons (regular and irregular)	
Notes	
▪ Other polygons include pentagon, hexagon, heptagon and octagon.	
▪ Use trigonometry.	
Suggested Resources	
▪ Charts illustrating various polygons	
▪ Polygonal shapes	
Suggested Further Assessment	
▪ practical exercises	
- short test on 34.0.0	
33.0.0 AREA OF A TRIANGLE (7 Lessons)	
33.1.0 Specific Objectives	By the end of the topic, the learner should be able to:
a) Derive the formula; $\text{Area} = \frac{1}{2} ab \sin C$	
b) Solve problems involving area of triangles using the formula $\text{Area} = \frac{1}{2} ab \sin C$	
c) Solve problems on area of a triangle using the formula $\text{area} = \sqrt{s(s - a)(s - b)(s - c)}$	
Content	
33.2.0 Content	
33.2.1 Area of triangle $A = \frac{1}{2} ab \sin C.$	
33.2.2 Area of a triangle $A = \sqrt{s(s - a)(s - b)(s - c)}$	
33.2.3 Application to Real life situations	
Note	
▪ $s = \frac{a + b + c}{2}$, where a, b and c are the sides of triangle ABC	
Suggested Resources	
▪ Charts illustrating different ways of showing area of a triangle.	
Suggested Further Assessment	
- practical exercises	
- Short test on 33.0.0	

32.2.7 Application of trigonometry to real life situations	
Notes	
▪ Use a general right angled triangle to define the ratios	
▪ Apply trigonometry to bearings, angles of elevation and depression	
Suggested Resources	
▪ Right angled triangles,	
- Mathematical tables	
- Real life situations	
Suggested Further Assessment	
▪ Test on 31.0.0, 32.0.0	
34.0.0 AREA OF QUADRILATERALS AND OTHER POLYGONS (4 Lessons)	
34.1.0 Specific Objectives	By the end of the topic, the learner should be able to:
a) find the area of other polygons (regular and irregular).	
Content	
34.2.0 Content	
34.2.1 Area of quadrilaterals.	
34.2.2 Area of other polygons (regular and irregular)	
Notes	
▪ Other polygons include pentagon, hexagon, heptagon and octagon.	
▪ Use trigonometry.	
Suggested Resources	
▪ Charts illustrating various polygons	
▪ Polygonal shapes	
Suggested Further Assessment	
▪ practical exercises	
- short test on 34.0.0	
33.0.0 AREA OF A TRIANGLE (7 Lessons)	
33.1.0 Specific Objectives	By the end of the topic, the learner should be able to:
a) Derive the formula;	
$\text{Area} = \frac{1}{2} ab \sin C$	
b) Solve problems involving area of triangles using the formula $\text{Area} = \frac{1}{2} ab \sin C$	
c) Solve problems on area of a triangle using the formula $\text{area} = \sqrt{s(s - a)(s - b)(s - c)}$	
Content	
33.2.0 Content	
33.2.1 Area of triangle $A = \frac{1}{2} ab \sin C.$	
33.2.2 Area of a triangle $A = \sqrt{s(s - a)(s - b)(s - c)}$	
33.2.3 Application to Real life situations	
Note	
▪ $s = \frac{a + b + c}{2}$, where a, b and c are the sides of triangle ABC	
Suggested Resources	
▪ Charts illustrating different ways of showing area of a triangle.	
Suggested Further Assessment	
- practical exercises	
- Short test on 33.0.0	

		Suggested Further	
		<u>Assessment</u>	
	Short test on 35.0.0		
36.0.0 SURFACE AREA OF SOLIDS (10 Lessons)			
36.1.0 Specific Objectives	By the end of the topic the learner should be able to:		
a) find the surface area of a prism b) find the surface area of a pyramid c) find the surface area of a cone d) find the surface area of a frustum e) find the surface area of a sphere.			
36.2.0 Content			
36.2.1 Surface area of prisms, pyramids, cones, frustums and spheres			
Notes			
		Suggested Resources	
	Models of solids (prism, pyramid cone, frustum and sphere)		
	Suggested Further		
	<u>Assessment</u>		
	Test on 33.0.0, 34.0.0, 35.0.0, 36.0.0		
38.0.0 QUADRATIC EXPRESSIONS AND EQUATIONS (12 Lessons)			
38.1.0 Specific Objectives	By the end of the topic, the learner should be able to:		
a) expand algebraic expressions that form quadratic equations b) derive the three quadratic identities c) identify and use the three quadratic identities d) factorise quadratic expressions including the identities e) solve quadratic equations by factorization f) form and solve quadratic equations.			
38.2.0 Content			
38.2.1 Expansion of algebraic expressions - short test on 36.0.0			
37.0.0 VOLUME OF SOLIDS (12 Lessons)			
37.1.0 Specific Objectives	By the end of the topic, the learner should be able to:		
a) find the volume of a prism b) find the volume of a pyramid c) find the volume of a cone d) find the volume of a frustum e) find the volume of a sphere.			
37.2.0 Content			
37.2.1 Volume of a prism, a pyramid, a cone, a frustum and a sphere			
Notes			
		Suggested Resources	
	Linear scale factor and volume scale factor may be used in finding the volume of a frustum.		
	Notes		
	a) find the volume of a frustum b) find the volume of a sphere.		
	c) find the volume of a cone d) find the volume of a prism e) find the volume of a pyramid		
	Content		
	Volume of a prism, a pyramid, a cone, a frustum and a sphere		
Notes			
		Suggested Resources	
	- Charts illustrating quadratic identities - Situations that lead to Formation of quadratic equations		
		Suggested Further	
		<u>Assessment</u>	
	Short test on 39.0.0		
39.0.0 LINEAR MOTION (10 Lessons)			
39.1.0 Specific Objectives	By the end of the topic, the learner should be able to:		
a) define displacement, speed, velocity and acceleration b) distinguish between i) distance and displacement ii) speed and velocity c) determine velocity and acceleration d) plot and draw graphs of linear motion(distance and velocity time graphs) e) interpret graphs of linear motion f) define relative speed g) solve problems involving relative speed.			
39.2.0 Content			
39.2.1 Inequalities on a number line. 39.2.2 Simple and compound inequality statements.			
Notes			
		Suggested Resources	
	- Practical exercises - Short test on 38.0.0		
		Suggested Further	
		<u>Assessment</u>	
	- Test on 37.0.0, 38.0.0, 39.0.0, and 40.0.0		
41.0.0 STATISTICS (20 Lessons)			
41.2.0 Specific Objectives	Short test on 39.0.0		

- By the end of the topic, the learner should be able to:
- a) define statistics
 - b) collect and organise data
 - c) draw a frequency distribution table
 - d) group data into reasonable classes
 - e) calculate measures of central tendency.
 - i) mean
 - ii) mode
 - iii) median for ungrouped and grouped data.
 - f) represent data in form of line graph, bar graphs, pie-charts, pictogram, histogram and frequency polygons
 - g) interpret data from real life situations
- 41.2.0 Content**
- 41.2.1 Definition of statistics
- 41.2.2 Collection and organization of data
- 41.2.3 Frequency distribution tables (for grouped and ungrouped data)
- 41.2.4 Grouping data
- 41.2.5 Mean, mode and median
- 41.2.6 Representation of data
- Line graph
 - Bar graph
 - Pie chart
 - Pictogram
 - Histogram
 - Frequency polygon
- 41.2.7 Interpretation of data
- Notes**
- Data from the learners experiences should be used.
 - Class limits and class boundaries should be distinguished.
 - Equal and unequal class intervals should be used in drawing and interpreting histograms.
- Suggested Resources**
- Data from the environment, charts illustrating various

		43.2.6 Multiplication of a vector by a scalar
	Suggested Resources	
	- Mathematical instruments	43.2.7 Column vectors
	- Charts illustrating angle properties of a circle.	43.2.8 Position vectors
	Suggested Further Assessment	43.2.9 Magnitude of a vector
		43.2.10 Midpoint of a vector
		43.2.11 Translation vector
		Short test on 42.0.0
		Notes
		▪ Students should be exposed to various vector notations. One of the notations should be adopted.
		▪ Use practical situations to introduce translation
	Suggested Resources	Square boards, graph papers, geometrical instruments.
	Suggested Further Assessment	Quiz, test on 42.0.0 and 43.0.0
	43.0.0 VECTORS(1) (20 Lessons)	
	43.1.0 Specific Objectives	
		By the end of the topic, the learner should be able to:
		▪ define vector and scalar
		▪ use vector notation
		▪ represent vectors both single and combined geometrically
		▪ identify equivalent vectors
		▪ add vectors
		▪ multiply vectors by scalars
		▪ define position vector and column vector
		▪ find magnitude of a vector
		▪ find mid-point of a vector
		▪ define translation as a transformation.
	43.2.0 Content	
	42.2.1 Arc, chord and segment	43.2.1 Vector and scalar quantities
	42.2.2 Angles subtended by the same arc at the circumference	43.2.2 Vector notation
	42.2.3 Relationship between angle subtended at the centre and angle subtended on the circumference by the same arc	43.2.3 Representation of vectors
	42.2.4 Angle in a semi-circle	43.2.4 Equivalent vectors
	42.2.5 Angle properties of a cyclic quadrilateral	43.2.5 Addition of vectors
	42.2.6 Finding angles of a cyclic quadrilateral	
	Notes	
		▪ Distinguish between angle subtended by an arc and angle subtended by a chord
		▪ Reasons in the process of solving for angles should be emphasized
	Suggested Resources	
		- Data from the environment, charts illustrating various

FORM THREE

<p>44.0.0 QUADRATIC EXPRESSIONS AND EQUATIONS (2) (22 Lessons)</p> <p>44.1.0 Specific Objectives</p> <p>By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) factorise quadratic expressions b) identify perfect squares c) complete the square d) solving quadratic equations by completing the square e) derive the quadratic formula f) solve quadratic equations using the formula g) form and solve quadratic equations from roots and given situations h) make tables of values from a quadratic relation i) draw the graph of a quadratic relation j) solve quadratic equations using graphs k) solve simultaneous equations (one linear and one quadratic) analytically and graphically l) apply the knowledge of quadratic equations to real life situations. 	<p>Notes</p> <ul style="list-style-type: none"> - Use quadratic equation to solve other related quadratic equations graphically - Interpret the discriminant i.e. $\sqrt{b^2 - 4ac}$. <p>Suggested Resources</p> <ul style="list-style-type: none"> - Square boards - Graph papers <p>Suggested Assessment</p> <p>Test on 44.0.0</p>	<p>44.2.10 Solution of quadratic equations - one linear and one quadratic</p> <p>44.2.12 Application to real life situation</p> <p>Notes</p> <ul style="list-style-type: none"> - Use quadratic equation to solve other related quadratic equations graphically - Interpret the discriminant i.e. $\sqrt{b^2 - 4ac}$. <p>Suggested Resources</p> <ul style="list-style-type: none"> - Square boards - Graph papers <p>Suggested Assessment</p> <p>Test on 44.0.0</p>	<p>44.2.10 Graphs of quadratic equations</p> <p>44.2.1 Simultaneous equations - one linear and one quadratic</p> <p>44.2.12 Application to real life situation</p> <p>Notes</p> <ul style="list-style-type: none"> - Use quadratic equation to solve other related quadratic equations graphically - Interpret the discriminant i.e. $\sqrt{b^2 - 4ac}$. <p>Suggested Resources</p> <ul style="list-style-type: none"> - Square boards - Graph papers <p>Suggested Assessment</p> <p>Test on 44.0.0</p>
<p>44.2.2 Perfect squares</p> <p>44.2.3 Completion of the square</p> <p>44.2.4 Solution of quadratic equations by completing the square</p> <p>44.2.5 Quadratic</p>	<p>44.2.2 Perfect squares</p> <p>44.2.3 Completion of the square</p> <p>44.2.4 Solution of quadratic equations by completing the square</p> <p>44.2.5 Quadratic</p>	<p>44.2.2 Content</p> <p>$\text{formula } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$</p> <p>44.2.3 Solution of quadratic equations using the formula.</p> <p>44.2.4 Formation of quadratic equations and solving them</p> <p>44.2.5 Tables of values for a given quadratic relation</p>	<p>44.2.2 Content</p> <p>$\text{formula } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$</p> <p>44.2.3 Solution of quadratic equations using the formula.</p> <p>44.2.4 Formation of quadratic equations and solving them</p> <p>44.2.5 Tables of values for a given quadratic relation</p> <p>Notes</p> <ul style="list-style-type: none"> - Use calculators in various computations involving the four basic operations, squares, square roots, cubes and cube roots. - Confining errors propagated in addition, subtraction, multiplication and division. - Include maximum and minimum errors from operations. <p>Suggested Resources</p> <ul style="list-style-type: none"> - Measuring instruments - Calculators - Real life experiences <p>Suggested Assessment</p> <ul style="list-style-type: none"> - Practical Exercises - Quiz
			<p>46.0.0 APPROXIMATIONS AND ERRORS (16 Lessons)</p> <p>46.1.0 Specific Objectives</p> <p>By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) define and draw the unit circle b) use the unit circle to find trigonometric ratios in terms of co-ordinates of points for $0^\circ \leq \theta \leq 360^\circ$ c) find trigonometric ratios of negative angles d) find trigonometric ratios of angles greater than 360° using the unit circle e) use mathematical tables and calculators to find trigonometric ratios of angles in the range $0^\circ \leq \theta \leq 360^\circ$ f) define radian measure g) draw graphs of trigonometric functions; $y = \sin x$, $y = \cos x$ and $y = \tan x$ using degrees and radians h) derive the sine rule i) derive the cosine rule <p>Notes</p> <ul style="list-style-type: none"> Conversion of radians to degrees and vice versa is necessary Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$ and Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ <p>Suggested Resources</p> <ul style="list-style-type: none"> - Unit circle - Graph paper - Square boards - Mathematical tables - Calculators - Real life experiences <p>Suggested Further</p> <ul style="list-style-type: none"> - Test on 45.0.0 and 46.0.0

47.0.0	SURDS (9 Lessons)	
	Content	
48.2.0	Logarithmic notation	
48.2.1	The laws of logarithms	
48.2.2	Simplification of logarithmic expressions	
48.2.3	Solution of logarithmic equations	
	Further computations using logarithmic laws.	
	Notes	
	- Logarithmic equations will also include indices.	
	Logarithmic Laws:	
	$\log(ab) = \log a + \log b$	
	$\log\left(\frac{a}{b}\right) = \log a - \log b$	
	$\log a^n = n \log a$	
	Content	
47.2.0	Rational and irrational numbers	
47.2.1	Simplification of surds	
47.2.2	Rationalisation of denominators	
	Notes	
	▪ Determination of conjugates is necessary	
	▪ Simplifications be left in surd form unless instructed otherwise	
	▪ Where evaluation is required, a calculator may be used but the process of working out the sum must be shown	
	Suggested Resources	
	Charts illustrating process of rationalisation.	
	Suggested Further Assessment	
	Short test on 47.0.0	
48.0.0	FURTHER LOGARITHMS (11 Lessons)	
	Specific Objectives	
	By the end of the topic, the learner should be able to:	
	a) derive logarithmic relation from index form and vice-versa	
	b) state the laws of logarithms	
	c) use logarithmic laws to simplify logarithmic expressions and solve logarithmic equations	
	d) apply laws of logarithms for further computations.	
	Content	
49.2.0	Principal rate and time	
49.2.1	Simple interest	
49.2.2	Compound interest using step by step method	
49.2.3	Derivation of compound interest formula	
49.2.4	Calculations using the compound interest formula	
49.2.5	Appreciation and depreciation	
	Content	
49.2.6	Calculation of appreciation and depreciation using the compound interest formula	
49.2.7	Hire purchase	
49.2.8	Income tax	
49.2.9	Notes	
	- Current income tax schedules to be used.	
	- Consider cases where compounding is done monthly, quarterly, and semi annually.	
	Suggested Resources	
	- Income tax schedule/bands	
	- Real life experiences	
	- Ready reckoner tables	
	- Calculators	
	Suggested Further Assessment	
	Tests on 47.0.0, 48.0.0 and 49.0.0	
50.0.0	CIRCLES CHORDS AND TANGENTS (21 Lessons)	
	Specific Objectives	
	By the end of the topic, the learner should be able to:	
	a) define principal, rate and time in relation to interest	
	b) calculate simple interest using simple interest formula	
	c) calculate compound interest using step by step method	
	d) derive the compound interest formula	
	e) apply the compound interest formula for calculating interest	
	f) define appreciation and depreciation	
	g) use compound interest formula to calculate appreciation and depreciation	
	Content	
50.2.0	Arcs, chords and tangents	
50.2.1	Lengths of tangents and intersecting chords	
50.2.2	Properties of chords	
50.2.3	Construction of tangents to a circle	
50.2.4	Direct and transverse common tangents to two circles	
50.2.5	Angles in alternate segment	
50.2.6	Circumscribed, inscribed and escribed circles	
50.2.7	Centroid and orthocentre	
50.2.8	Apply knowledge of tangents and chords to real life situations	
50.2.9	Notes	
	- Mention circumcircle, circumcentre, incentre and incircle and excentre	
	Suggested Resources	
	- Charts to illustrate the various properties	
	- Pulleys and wheels	
	Suggested Further Assessment	
	- Short on 50.0.0	
51.0.0	MATRICES (21 Lessons)	
	Specific Objectives	
	By the end of the topic, the learner should be able to:	
	a) define a matrix	
	b) state the order of a matrix	
	c) define a square matrix	
	d) determine compatibility in addition and multiplication of matrices	
	e) add matrices	
	f) multiply matrices	
	g) identify identity matrix	
	Content	
51.1.0	Specific Objectives	
	By the end of the topic, the learner should be able to:	
	a) calculate length of an arc and a chord	
	b) calculate lengths of tangents and intersecting chords	
	c) state and use properties of chords	
	d) construct tangent to a circle	
	e) construct direct and transverse common tangents to two circles	

51.2.6	Simultaneous linear equations	f) find determinant of $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$	51.2.2	Sequences	i) state and use the ratio theorem
51.2.7	Find the inverse of a 2×2 matrix	52.2.0 Content	53.2.3	Arithmetic sequence	j) apply vector methods in geometry.
51.2.8	Change of the subject	52.2.1 Change of the subject	53.2.4	Geometric sequence	
51.2.9	One method to solve simultaneous linear equations	52.2.2 Direct, inverse, partial and joint variations	53.2.5	Determining a term in a sequence	
51.2.10	Application of direct and inverse proportion	52.2.3 Constant of proportionality	53.2.6	Arithmetic progression (A.P)	54.2.0 Content
51.2.11	Matrices	52.2.4 Graphs of direct and inverse proportion	54.2.1	Coordinates in two and three dimensions	54.2.1 Coordinates in two and three dimensions
51.2.12	Order of a matrix	52.2.5 Formation of equation on variation from real life situations	54.2.2	Column and position vectors in three dimensions	54.2.2 Column and position vectors in three dimensions
51.2.13	Square matrix	Notes	54.2.3	Column vectors in terms of unit vectors \mathbf{i}, \mathbf{j} and \mathbf{k} .	54.2.3 Column vectors in terms of unit vectors \mathbf{i}, \mathbf{j} and \mathbf{k} .
51.2.14	Compatibility in addition and multiplication of matrices		54.2.4	Magnitude of a vector	
51.2.15	Multiplication of a matrix by a scalar		54.2.5	Parallel vectors	
51.2.16	Matrix multiplication		54.2.6	Collinearity	
51.2.17	Identity matrix		54.2.7	Proportional division of a line	
51.2.18	Determinant of a 2×2 matrix		54.2.8	Ratio theorem	
51.2.19	Inverse of a 2×2 matrix		54.2.9	Sum of a G.P	
51.2.20	Singular matrix		53.2.10	Application of A.P and G.P to real life situations	54.2.10 Application of A.P and G.P to real life situations
51.2.21	Solution of simultaneous linear equations in two unknowns				
52.2.0	Content				
52.2.1	Change of the subject				
52.2.2	Direct, inverse, partial and joint variations				
52.2.3	Constant of proportionality				
52.2.4	Graphs of direct and inverse proportion				
52.2.5	Formation of equation on variation from real life situations				
52.2.6	Faced to clarify the relation connecting "or" and "and" signs				
52.2.7	Specific Objectives				
52.2.8	Square boards				
52.2.9	Graph papers				
52.2.10	Real life situations				
52.2.11	Calculators				
52.2.12	Suggested Further Assessment				
53.0.0	SEQUENCES AND SERIES				
53.0.1	Objectives				
53.0.2	Test on 52.0.0 and 53.0.0				
53.1.0	Specific Objectives				
53.1.1	By the end of the topic, the learner should be able to:				
53.1.2	a) identify simple number patterns				
53.1.3	b) define a sequence				
53.1.4	c) identify the pattern for a given set of numbers and deduce the general rule				
53.1.5	d) determine a term in a sequence				
53.1.6	e) recognise arithmetic and geometric sequences				
53.1.7	f) form illustrating compatibility of matrices				
53.1.8	Calculator				
53.1.9	Suggested Further Assessment				
53.2.0	Content				
53.2.1	Simple number patterns				

55.2.0	Content	56.2.0	Content
55.2.1	Binomial expansion up to power four	56.2.1	Probability
55.2.2	Pascal's triangle	56.2.2	Experimental probability
55.2.3	Coefficient of terms in binomial expansion	56.2.3	Range of probability measure $0 \leq P(x) \leq 1$
55.2.4	Computation using binomial expansion	56.2.4	Probability space
55.2.5	Evaluation of numerical cases using binomial expansion	56.2.5	Theoretical probability
Notes	<ul style="list-style-type: none"> - Binomial expansion by multiplication up to power four only - Compute numerical cases such as $(1.05)^{10}$ and $(0.99)^{10}$ to specified number of terms and significant figures. - Use calculators but, process of working out the figures must be shown 	56.2.6	Discrete and continuous probability (simple cases only)
55.2.7	Combined events (mutually exclusive and independent events)	56.2.7	Combined events (mutually exclusive and independent events)
55.2.8	Laws of probability	56.2.8	Laws of probability
55.2.9	The tree diagrams	56.2.9	The tree diagrams
Suggested Resources	<ul style="list-style-type: none"> - Real life situations - Calculators 	Notes	<ul style="list-style-type: none"> - Include linear graphs and curves - Line of best fit does not always start from the origin - Include the following equations of a circle: $x^2 + y^2 = r^2$ $(x - a)^2 + (y - b)^2 = r^2$
Suggested Further Assessment	- Short test on 57.0.0	Suggested Resources	<ul style="list-style-type: none"> - Graph papers - Square boards - Real life situations
58.0.0	GRAPHICAL METHODS	58.1.0	Specific Objectives
	(21 Lessons)		By the end of the topic, the learner should be able to:
			<ul style="list-style-type: none"> a) make a table of values from given relations b) use the table of values to draw the graphs of the relations c) determine and interpret instantaneous rates of change from a graph d) interpret information from graphs e) draw and interpret graphs from empirical data f) solve cubic equations graphically g) draw the line of best fit h) identify the equation of a circle i) find the equation of a circle given the centre and the radius j) determine the centre and radius of a circle and draw the circle on a Cartesian plane.
Suggested Resources	<ul style="list-style-type: none"> - Charts illustrating Pascal's Triangle - Calculators 	Suggested Further Assessment	<ul style="list-style-type: none"> - Practical exercises - Test on 55.0.0 and 56.0.0
56.0.0	PROBABILITY (22 Lessons)	57.0.0	COMPOUND PROPORTIONS AND RATES OF WORK
56.1.0	Specific Objectives	57.1.0	Specific Objectives
	By the end of the topic, the learner should be able to:		By the end of the topic, the learner should be able to:
	<ul style="list-style-type: none"> a) define probability b) determine probability from experiments and real life situations c) construct a probability space d) determine theoretical probability e) differentiate between discrete and continuous probability f) differentiate mutually exclusive and independent events g) state and apply laws of probability h) use a tree diagram to determine probabilities. 		<ul style="list-style-type: none"> a) solve problems involving compound proportions using unitary and ratio methods b) apply ratios and proportions to real life situations c) solve problems involving rates of work
57.2.0	Content	58.2.0	Content
57.2.1	Proportional parts	58.2.1	Tables and graphs of given relations.
57.2.2	Compound proportions	58.2.2	Graphs of cubic equations
57.2.3	Ratios and rates of work	58.2.3	Graphical solutions of cubic equations.
57.2.4	Proportions applied to mixtures	58.2.4	Average rate of change
Notes			<ul style="list-style-type: none"> 58.2.5 Instantaneous rate of change 58.2.6 Empirical data and their graphs 58.2.7 The line of best fit 58.2.8 Equation of a circle 58.2.9 Finding of the equation of a circle
			<ul style="list-style-type: none"> - Revise ratios and proportions

FORM FOUR

					Notes
60.2.8	Quartile deviation				- Understanding of the language used in locus is important
60.2.9	Variance				- Knowledge of geometric construct is a prerequisite
60.2.10	Standard deviation				
59.0.0	MATRICES AND TRANSFORMATIONS (21Lessons)	59.2.10 Application of transformation to real life situations			
59.1.0	Specific Objectives				
	By the end of the topic, the learner should be able to:				
a)	relate image and object under a given transformation on the Cartesian plane				
b)	determine the matrix of a transformation				
c)	perform successive transformations				
d)	determine and identify a single matrix for successive transformation				
e)	relate identity matrix and transformation				
f)	determine the inverse of a transformation				
g)	establish and use the relationship between area scale factor and determinant of a matrix				
h)	determine shear and stretch transformations				
i)	define and distinguish isometric and non-isometric transformation				
j)	apply transformation to real life situations.				
59.2.0	Content				
59.2.1	Transformation on the Cartesian plane				
59.2.2	Identification of transformation matrix				
59.2.3	Successive transformations				
59.2.4	Single matrix of transformation for successive transformations.				
59.2.5	Identity matrix and transformation				
59.2.6	Inverse of a transformation				
59.2.7	Area scale factor and determinant of a matrix				
59.2.8	Shear and stretch (include their matrices)				
59.2.9	Isometric and non-isometric				
60.2.8	Quartile deviation				
60.2.9	Variance				
60.2.10	Standard deviation				
Notes					
	- Revise transformation covered previously				
Suggested Resources					
- Square boards					- Geometrical patterns
- Peg boards and strings					- Square boards
- Rubber bands					- Graph papers
- Models					
- Calculators					
Suggested Further Assessment					
- Practical exercises					- Suggested Further Assessment
- Data from real life situations					- Practical exercises
Suggested Resources					
- Square boards					- Test on unit 61.0.0
- Graph papers					
60.1.0	STATISTICS (2) (27 Lessons)				
60.1.0	Specific Objectives				
	By the end of the topic, the learner should be able to:				
a)	state the measures of central tendency				
b)	calculate the mean using the assumed mean method				
c)	make cumulative frequency table.				
d)	estimate the median and the quartiles by				
(i)	calculation and				
(ii)	ogive				
e)	define and calculate the measures of dispersion: range, quartiles, interquartile range, quartile deviation, variance and standard deviation				
	i) interpret measures of dispersion.				
	ii) define and calculate the measures of dispersion: range, quartiles, interquartile range, quartile deviation, variance and standard deviation				
60.2.0	Content				
59.2.1	Transformation on the Cartesian plane				
59.2.2	Identification of transformation matrix				
59.2.3	Successive transformations				
59.2.4	Single matrix of transformation for successive transformations.				
59.2.5	Identity matrix and transformation				
59.2.6	Inverse of a transformation				
59.2.7	Area scale factor and determinant of a matrix				
59.2.8	Shear and stretch (include their matrices)				
59.2.9	Isometric and non-isometric				
Notes					
	- Revise transformation covered previously				
Suggested Resources					
- Square boards					- Suggested Resources
- Peg boards and strings					- Practical exercises
- Rubber bands					- Test on unit 61.0.0
- Models					
- Calculators					
Suggested Further Assessment					
- Practical exercises					- Suggested Further Assessment
- Data from real life situations					- Practical exercises
Suggested Resources					
- Square boards					- Specific Objectives
- Graph papers					By the end of the topic, the learner should be able to:
				a)	recall and define trigonometric ratios
				b)	derive trigonometric identity $\sin^2 x + \cos^2 x = 1$
				c)	draw graphs of trigonometric ratios of the form $y = \sin x$, $y = \cos x$, $y = \tan x$, $y = \sin bx$, $y = \cos bx$, $y = \tan bx$
				d)	$y = \sin(bx \pm \theta)$, $y = \cos(bx \pm \theta)$, $y = \tan(bx \pm \theta)$
				e)	solve simple trigonometric equations analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	define Locus
				b)	describe common types of Loci
				c)	construct
				d)	(i) loci involving inequalities (ii) loci involving chords (iii) loci involving points under given conditions (iv) intersecting loci
				e)	analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	common types of Loci
				b)	Perpendicular bisector loci
				c)	Loci of a point at a given distance from a fixed point and a fixed line
				d)	Angle bisector loci
				e)	Constant angle loci
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	Trigonometric ratios deriving the relation $\sin^2 x + \cos^2 x = 1$
				b)	graphs of trigonometric functions $y = \sin x$, $y = \cos x$, $y = \tan x$
				c)	$y = \sin x$, $y = \cos x$, $y = \tan x$
				d)	$y = \sin(bx \pm \theta)$, $y = \cos(bx \pm \theta)$, $y = \tan(bx \pm \theta)$
				e)	solve simple trigonometric equations analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	common types of Loci
				b)	Perpendicular bisector loci
				c)	Loci of a point at a given distance from a fixed point and a fixed line
				d)	Angle bisector loci
				e)	Constant angle loci
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	Trigonometric ratios deriving the relation $\sin^2 x + \cos^2 x = 1$
				b)	graphs of trigonometric functions $y = \sin x$, $y = \cos x$, $y = \tan x$
				c)	$y = \sin x$, $y = \cos x$, $y = \tan x$
				d)	$y = \sin(bx \pm \theta)$, $y = \cos(bx \pm \theta)$, $y = \tan(bx \pm \theta)$
				e)	solve simple trigonometric equations analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	common types of Loci
				b)	Perpendicular bisector loci
				c)	Loci of a point at a given distance from a fixed point and a fixed line
				d)	Angle bisector loci
				e)	Constant angle loci
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	Trigonometric ratios deriving the relation $\sin^2 x + \cos^2 x = 1$
				b)	graphs of trigonometric functions $y = \sin x$, $y = \cos x$, $y = \tan x$
				c)	$y = \sin x$, $y = \cos x$, $y = \tan x$
				d)	$y = \sin(bx \pm \theta)$, $y = \cos(bx \pm \theta)$, $y = \tan(bx \pm \theta)$
				e)	solve simple trigonometric equations analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	common types of Loci
				b)	Perpendicular bisector loci
				c)	Loci of a point at a given distance from a fixed point and a fixed line
				d)	Angle bisector loci
				e)	Constant angle loci
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	Trigonometric ratios deriving the relation $\sin^2 x + \cos^2 x = 1$
				b)	graphs of trigonometric functions $y = \sin x$, $y = \cos x$, $y = \tan x$
				c)	$y = \sin x$, $y = \cos x$, $y = \tan x$
				d)	$y = \sin(bx \pm \theta)$, $y = \cos(bx \pm \theta)$, $y = \tan(bx \pm \theta)$
				e)	solve simple trigonometric equations analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	common types of Loci
				b)	Perpendicular bisector loci
				c)	Loci of a point at a given distance from a fixed point and a fixed line
				d)	Angle bisector loci
				e)	Constant angle loci
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	Trigonometric ratios deriving the relation $\sin^2 x + \cos^2 x = 1$
				b)	graphs of trigonometric functions $y = \sin x$, $y = \cos x$, $y = \tan x$
				c)	$y = \sin x$, $y = \cos x$, $y = \tan x$
				d)	$y = \sin(bx \pm \theta)$, $y = \cos(bx \pm \theta)$, $y = \tan(bx \pm \theta)$
				e)	solve simple trigonometric equations analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	common types of Loci
				b)	Perpendicular bisector loci
				c)	Loci of a point at a given distance from a fixed point and a fixed line
				d)	Angle bisector loci
				e)	Constant angle loci
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	Trigonometric ratios deriving the relation $\sin^2 x + \cos^2 x = 1$
				b)	graphs of trigonometric functions $y = \sin x$, $y = \cos x$, $y = \tan x$
				c)	$y = \sin x$, $y = \cos x$, $y = \tan x$
				d)	$y = \sin(bx \pm \theta)$, $y = \cos(bx \pm \theta)$, $y = \tan(bx \pm \theta)$
				e)	solve simple trigonometric equations analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	common types of Loci
				b)	Perpendicular bisector loci
				c)	Loci of a point at a given distance from a fixed point and a fixed line
				d)	Angle bisector loci
				e)	Constant angle loci
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	Trigonometric ratios deriving the relation $\sin^2 x + \cos^2 x = 1$
				b)	graphs of trigonometric functions $y = \sin x$, $y = \cos x$, $y = \tan x$
				c)	$y = \sin x$, $y = \cos x$, $y = \tan x$
				d)	$y = \sin(bx \pm \theta)$, $y = \cos(bx \pm \theta)$, $y = \tan(bx \pm \theta)$
				e)	solve simple trigonometric equations analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	common types of Loci
				b)	Perpendicular bisector loci
				c)	Loci of a point at a given distance from a fixed point and a fixed line
				d)	Angle bisector loci
				e)	Constant angle loci
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	Trigonometric ratios deriving the relation $\sin^2 x + \cos^2 x = 1$
				b)	graphs of trigonometric functions $y = \sin x$, $y = \cos x$, $y = \tan x$
				c)	$y = \sin x$, $y = \cos x$, $y = \tan x$
				d)	$y = \sin(bx \pm \theta)$, $y = \cos(bx \pm \theta)$, $y = \tan(bx \pm \theta)$
				e)	solve simple trigonometric equations analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	common types of Loci
				b)	Perpendicular bisector loci
				c)	Loci of a point at a given distance from a fixed point and a fixed line
				d)	Angle bisector loci
				e)	Constant angle loci
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	Trigonometric ratios deriving the relation $\sin^2 x + \cos^2 x = 1$
				b)	graphs of trigonometric functions $y = \sin x$, $y = \cos x$, $y = \tan x$
				c)	$y = \sin x$, $y = \cos x$, $y = \tan x$
				d)	$y = \sin(bx \pm \theta)$, $y = \cos(bx \pm \theta)$, $y = \tan(bx \pm \theta)$
				e)	solve simple trigonometric equations analytically and graphically
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	common types of Loci
				b)	Perpendicular bisector loci
				c)	Loci of a point at a given distance from a fixed point and a fixed line
				d)	Angle bisector loci
				e)	Constant angle loci
					- Suggested Further Assessment
					- Specific Objectives
					By the end of the topic, the learner should be able to:
				a)	Trigonometric ratios deriving the relation $\sin^2 x + \cos^2 x = 1$
				b)	graphs of trigonometric functions $y = \sin x$, $y = \cos x$, $y = \tan x$
				c)	$y = \sin x$, $y = \cos x$, $y = \tan x$
</					

	$y = a \cos(bx + \theta)$ $y = a \tan(bx \pm \theta)$	63.2.3 length of a line in 3-dimensional geometry	
62.2.4	simple trigonometric equations amplitude, period, wavelength and phase angle of trigonometric functions.	63.2.4 the angle between (i) a line and a line (ii) a plane and a plane (iii) a plane and a plane angles between skewlines	
	Notes	- Making a correct table of values from a trigonometric function and correct plotting of points are essential. - Identification of symmetry and its use in drawing waves is important	
	Suggested Resources	- Revise sketching common solids - 3-dimensional models must be used	
		- 3-dimensional models both skeleton and solid and detachable models objects used in real life situations	
		Suggested Further Assessment	
		- Practical exercises - Test on 63.0.0 related topics	
63.0.0	THREE DIMENSIONAL GEOMETRY (24 Lessons)	64.0.0 LONGITUDES AND LATITUDES (21 Lessons)	
	63.1.0 Specific Objectives	By the end of the topic, the learner should be able to:	
		a) state the geometric properties of common solids b) identify projection of a line onto a plane c) identify skew lines d) calculate the length between two points in three dimensional geometry e) identify and calculate the angle between (i) two lines (ii) a line and a plane (iii) two planes	
		Suggested Further Assessment	
		Test on 62.0.0 and related topics	
		63.2.0 Content	
		Geometrical properties of common solids	
		Skew lines and projection of a line onto a plane	

64.2.0	Content	Latitude and longitude(great and small circles), The Equator and Greenwich Meridian	d) apply linear programming to real life situations.
64.2.1		Radius of small and great circles	
64.2.2		Position of a place on the surface of the earth	
64.2.3		Distance between two points along the small and great circles in nautical miles and kilometres.	
64.2.4		Distance in nautical miles and kilometres along a circle of latitude	
64.2.5		Time and longitude	
64.2.6		Speed in knots and Kilometres per hour	
64.2.7		Notes	
64.2.8		- Revise sketching common solids - 3-dimensional models must be used	
	Suggested Resources	- 3-dimensional models both skeleton and solid and detachable models objects used in real life situations	
		Suggested Further Assessment	
		- Practical exercises - Test on 63.0.0 related topics	
64.0.0	LONGITUDES AND LATITUDES (21 Lessons)	64.1.0 Specific Objectives	
		By the end of the topic, the learner should be able to:	
		a) define the great and small circles in relation to a sphere (including the earth) b) establish the relationship between the radii of small and great circles c) locate a place on the earths surface in terms of latitude and longitude d) calculate the distance between two points along the great circles and small circles (longitude and latitude) in nautical miles (nm) and kilometres (km)	
		e) calculate time in relation to longitudes f) calculate speed in knots and kilometres per hour.	
		Suggested Resources	
		- Globe - Calculator - Ball	
		Suggested Further Assessment	
		Test on unit 64.0.0 and related topics	
65.0.0	LINEAR PROGRAMMING (21 Lessons)	65.1.0 Specific Objectives	
		By the end of the topic, the learner should be able to:	
		a) form linear inequalities based on real life situations b) represent the linear inequalities on a graph c) solve and interpret the optimum solution of the linear inequalities	
		Specific Objectives	
		By the end of the topic, the learner should be able to:	
		a) form linear inequalities based on real life situations b) represent the linear inequalities on a graph c) solve and interpret the optimum solution of the linear inequalities	
65.2.0	Content	Formation of linear inequalities Analytical solutions of linear inequalities	
65.2.1		Solutions of linear inequalities by graphs	
65.2.2		Optimisation (include objective function)	
65.2.3		Application to real life situations	
65.2.4		Notes	
65.2.5		- Revise on linear inequalities - Emphasis should be put on key words and their related symbols such as at least, less than, at most, more than, not less than, not more than and so on.	
	Suggested Resources	- Square boards - Graph papers	
		Suggested Further Assessment	
		- Test on 65.0.0 and related topics	
66.0.0	DIFFERENTIATION (19 Lessons)	66.1.0 Specific Objectives	
		By the end of the topic, the learner should be able to:	
		a) find average rates of change and instantaneous rates of change b) find the gradient of a curve at a point using tangent c) relate the delta notation to rates of change; d) find the gradient function of a function of the form $y = x^n$ (n is a positive integer) e) define (i) derivative of a function (ii) derived function of a polynomial (iii) differentiation	

f) determine the derivative of a polynomial	b) derive the trapezium rule	d) integrate a polynomial
g) find equations of tangents and normals to the curves	c) apply trapezium rule to approximate areas of irregular shapes	e) apply integration in finding the area under a curve
h) sketch a curve	d) apply trapezium rule to estimate areas under curves	f) apply integration in kinematics.
i) apply differentiation in calculating distance, velocity and acceleration	e) derive the mid-ordinate rule	68.2.0 Content
j) apply differentiation in finding maxima and minima of a junction.	f) apply mid-ordinate rule to approximate area under a curve.	68.2.1 Differentiation 68.2.2 Reverse differentiation 68.2.3 Integration notation and sum of areas of trapezia 68.2.4 Indefinite and definite integrals
66.2.0 Content	67.2.0 Content	68.2.5 Area under a curve by integration 68.2.6 Application in kinematics
66.2.1 Average and instantaneous rates of change	67.2.1 Area by counting techniques	68.2.4 Area under a curve by integration 68.2.6 Application in kinematics
66.2.2 Gradient of a curve at a point	67.2.2 Trapezium rule	68.2.6 Consider area of curves above and below the x - axis
66.2.3 Gradient of $y=x^n$ (where n is a positive integer)	67.2.3 Area using trapezium rule	68.2.6 Curve - sketching is important in identifying the required region
66.2.4 Delta notation (Δ)	67.2.4 Mid-ordinate rule	68.2.6 Avoid substitution methods of integration.
66.2.5 Derivative of a polynomial	67.2.5 Area by the mid-ordinate rule	68.2.6 Compare approximation of area by; trapezoidal rule, mid-ordinate rule and by integration.
66.2.6 Equations of tangents and normals to the curve	Notes	68.2.6 If a curve is to be drawn either it should not exceed the 3 rd degree or a table of values is given for students to plot and draw.
66.2.7 Stationery points	- Revise area of irregular shapes and area of a trapezium	68.2.6 Suggested Resources
66.2.8 Curve sketching	- Square boards	68.2.6 Suggested Further Assessment
66.2.9 Application of differentiation in calculation of distance, velocity and acceleration.	- Graph papers	68.2.6 Suggested Resources
66.2.10 Maxima and minima	- Tracing papers for tracing irregular shapes from maps	68.2.6 Suggested Further Assessment
	- Worksheet containing practical work on trapezium and mid-ordinate rules	68.2.6 Suggested Resources
	- Test on 67.0.0 and related topics	68.2.6 Suggested Further Assessment
67.0.0 AREA APPROXIMATION (10 Lessons)	68.0.0 INTEGRATION (19 Lessons)	68.2.6 Suggested Assessment
67.1.0 Specific Objectives	68.1.0 Specific Objectives	68.2.6 Oral and written exercises
By the end of the topic, the learner should be able to:	By the end of the topic, the learner should be able to:	Test on 66.0.0, 67.0.0, and 68.0.0
a) approximate the area of irregular shapes by counting techniques	a) carry out the process of differentiation	68.2.6 Suggested Resources
	b) interpret integration as a reverse process of differentiation	68.2.6 Suggested Further Assessment
	c) relate integration notation to sum of areas of trapezia under a curve	68.2.6 Suggested Assessment

PHYSICS

INTRODUCTION

The Physics Syllabus is designed to offer varied experiences to the learner. The experiences are meant to lead to an all round mental, social and moral development of the learner.

This syllabus presents Physics as a body of knowledge about the physical environment. It employs a systematic scientific methodology of study to arouse learners way of reasoning and create positive attitude. To this end the use of teacher/learner discussion, teacher demonstration and group/class experiments as methods of instruction is encouraged. It emphasises not only the understanding of the fundamental scientific concept and principles, but also the experimental approach of investigation. The experimental approach should prepare the learner to present scientific concepts and ideas in the modern technology. Teachers are encouraged to expand upon suggested projects and teaching methodologies for effective implementation of this syllabus. These projects are designed to enrich the experiments carried out in the laboratory and enhance creativity. The project work approach provides a learner with opportunities in undertaking investigations for purposes of finding solutions to problems. It also helps in the transfer and application of the required scientific knowledge to solving problems encountered in day-to-day experiences. Field visits to resource centre/institutions of higher learning and industries are encouraged to enrich and modernize the teaching/learning process.

The general and specific objectives have been carefully articulated to ensure clarity of the intended learning outcomes. The time allocated for each topic is adequate and will enable the average learner not only acquire knowledge but also discover more about the world around him/her and as such develop interest in the subject.

The syllabus also aims at inculcating in the learner virtues such as diligence and high integrity. Care has also been taken to sensitise the learner on aspects of health and environmental concerns. The syllabus ensures appropriate balance in the development of cognitive, psychomotor and affective skills.

The teacher of Physics is therefore challenged to make the subject more appealing through experimental approach and proper planning.

GENERAL OBJECTIVES

By the end of the course, the learner should be able to:

1. select and use appropriate instruments to carry out measurements in the physical environment
2. use the knowledge acquired to discover and explain the order of the physical environment
3. use the acquired knowledge in the conservation and management of the environment
4. apply the principles of Physics and acquired skills to construct appropriate scientific devices from the available resources
5. develop capacity for critical thinking in solving problems in any situation
6. contribute to the technological and industrial development of the nation
7. appreciate and explain the role of Physics in promoting health in society
8. observe general safety precautions in all aspects of life
9. acquire and demonstrate a sense of honesty and high integrity in all aspects of Physics and life in general
10. acquire positive attitude towards Physics
11. acquire adequate knowledge in Physics for further education and/or training.

FORM ONE

4.0.0 PRESSURE (24 Lessons)

1.0.0	INTRODUCTION TO PHYSICS (4 Lessons)	2.2.0 Content 2.2.1 Definition of length, area, volume, mass, density and time SI units and symbols Estimation of quantities Conversion of units Measuring instruments Experiments on density Problems on density	4.1.0 Specific Objectives By the end of this topic, the learner should be able to: (a) explain what the study of physics involves (b) relate physics to other subjects and to technology (c) identify career opportunities related to physics (d) state and explain basic laboratory safety rules.	4.1.0 Content Definition of length, area, volume, mass, density and time SI units and symbols Estimation of quantities Conversion of units Measuring instruments Experiments on density Problems on density	4.1.0 Specific Objectives By the end of this topic, the learner should be able to: a) define pressure and state its units b) determine pressure exerted by solids c) describe experiments to investigate factors affecting pressure in fluids; d) derive the formula $P = \rho gh$ e) state the principle of transmission of pressure in fluids (Pascals principle) f) explain atmospheric pressure and its effect g) state and explain the applications of pressure h) solve numerical problems involving pressure.
1.1.0	Specific Objectives	1.2.0 Content Physics as a Science(reference to Primary Science Syllabus) Meaning of Physics Branches of Physics Relation between Physics, other subjects and technology Career opportunities in Physics Basic laboratory safety rules	3.0.0	FORCE (16 Lessons)	4.2.0 Content Definition of pressure Pressure in solids Factors affecting pressure in fluid (Experimental treatment required) Derivation of $P = \rho gh$ Atmospheric pressure Simple mercury barometer, manometers Applications of pressure; drinking straw, syringe, siphon, hydraulic press, hydraulic brakes, bicycle pump, force pump, lift pump
1.2.0	Content	1.2.1 1.2.2 1.2.3 1.2.4 1.2.5 1.2.6	3.1.0	Specific Objectives	4.2.0 Content Definition of pressure Pressure in solids Factors affecting pressure in fluid (Experimental treatment required) Derivation of $P = \rho gh$ Atmospheric pressure Simple mercury barometer, manometers Applications of pressure; drinking straw, syringe, siphon, hydraulic press, hydraulic brakes, bicycle pump, force pump, lift pump
2.0.0	MEASUREMENTS I (12 Lessons)	3.2.0 Content 3.2.1 Definition of force 3.2.2 Types of forces (including cohesive, adhesive and surface tension)	3.2.0 Content 3.2.1 Definition of force 3.2.2 Types of forces (including cohesive, adhesive and surface tension)	4.3.0 Project Work Construct a hydraulic press model.	6.2.9 Content Temperature Thermometers: - liquid - in - glass, - clinical, - six's maximum and minimum gases
2.1.0	Specific Objectives	3.2.3 SI units estimate length, mass and time use accurately the following measuring instruments; metre rule, tape measure, beam balance, stop clock/watch, measuring cylinder, pipette and burette d) determine experimentally the densities of substances f) solve numerical problems on density.	3.2.3 Experiments to demonstrate cohesion, adhesion and surface tension. 3.2.4 Effects of force 3.2.5 Mass, weight and their relationship 3.2.6 Scalar and vector quantities 3.2.7 Problem involving $W = mg$ (take $g = 10 \text{ N/kg}$)	5.0.0 PARTICULATE NATURE OF MATTER (12 Lessons)	6.2.1 - liquid - in - glass, - clinical, - six's maximum and minimum gases 6.2.4 Effects of expansion and contraction 6.2.5 Unusual expansion of water (Anomalous expansion)

4.0.0	PRESSURE (24 Lessons)	5.2.0 Content Experiments to show that matter is made up of tiny particles (e.g. cutting papers into small pieces), dilution experiments	5.2.1 Brownian motion States of matter Diffusion (Graham's law not required)	6.0.0	THERMAL EXPANSION (12 Lessons)
4.1.0	Specific Objectives	5.2.2 By the end of this topic, the learner should be able to: a) define pressure and state its units b) determine pressure exerted by solids c) describe experiments to investigate factors affecting pressure in fluids; d) derive the formula $P = \rho gh$ e) state the principle of transmission of pressure in fluids (Pascals principle) f) explain atmospheric pressure and its effect g) state and explain the applications of pressure h) solve numerical problems involving pressure.	5.2.2 By the end of this topic, the learner should be able to: a) define temperature b) describe the functioning of various thermometers c) describe thermal expansion in solids, liquids and gases d) explain expansion in terms of particle behaviour e) describe the unusual expansion of water and its effects f) explain the effects and applications of thermal expansion.	6.1.0	Specific Objectives By the end of this topic, the learner should be able to: a) define temperature b) describe the functioning of various thermometers c) describe thermal expansion in solids, liquids and gases d) explain expansion in terms of particle behaviour e) describe the unusual expansion of water and its effects f) explain the effects and applications of thermal expansion.
4.2.0	Content	4.2.1 Definition of pressure 4.2.2 Pressure in solids 4.2.3 Factors affecting pressure in fluid (Experimental treatment required) 4.2.4 Derivation of $P = \rho gh$ 4.2.5 Atmospheric pressure	4.2.1 Definition of pressure 4.2.2 Pressure in solids 4.2.3 Factors affecting pressure in fluid (Experimental treatment required) 4.2.4 Derivation of $P = \rho gh$ 4.2.5 Atmospheric pressure	4.3.0	Project Work Construct a hydraulic press model.
5.0.0	PARTICULATE NATURE OF MATTER (12 Lessons)	5.1.0	5.1.0 Specific Objectives By the end of this topic, the learner should be able to: a) show that matter is made up of tiny particles	6.2.2 - liquid - in - glass, - clinical, - six's maximum and minimum gases 6.2.4 Effects of expansion and contraction 6.2.5 Unusual expansion of water (Anomalous expansion)	

6.2.5 Applications of thermal expansion, include Bimetallic strip	f) state the characteristics of images formed by plane mirrors	9.2.0 Content 9.2.1 Electrostatic charging of objects by rubbing (experimental treatment required)
7.0.0 HEAT TRANSFER (12 Lessons)	g) explain the applications of reflection at plane surfaces	9.2.2 Types of charges and law of charges
7.1.0 Specific Objectives By the end of this topic, the learner should be able to:	h) solve numerical problems involving pin-hole camera and mirrors inclined at an angle.	9.2.3 The source of charge 9.2.4 The coulomb
a) define heat		9.2.5 Leaf electroscope: features, charging and discharging
b) state the difference between temperature and heat	8.2.0 Content 8.2.1 Rectilinear propagation of light (experimental treatment required)	9.2.6 Charging by contact and by induction
c) state and explain the modes of heat transfer	8.2.2 Formation of shadows and eclipses (umbra and penumbra)	9.2.7 Identification of charge 9.2.8 Conductors and insulators
d) describe experiments to illustrate factors affecting heat transfer	8.2.3 Pin-hole camera image formation and magnification	
e) explain applications of heat transfer.	8.2.4 Laws of reflection 8.2.5 Images formed by plane mirrors, ray diagrams, parallel and inclined mirrors	10.0.0 CELLS AND SIMPLE CIRCUITS (12 Lessons)
	8.2.6 Devices based on reflection: periscope, kaleidoscope	10.1.0 Specific Objectives By the end of this topic, the learner should be able to:
	8.2.7 Problems on pin-hole camera and mirrors inclined at an angle	a) draw and set-up simple electric circuits b) identify circuit symbols c) define electric current d) explain the working of primary and secondary cells e) explain the care and maintenance of secondary cells
7.2.0 Content		10.2.0 Content 10.2.1 Simple electric circuits: cell, ammeter, voltmeter, variable resistor, connecting wires, bulb and switches
7.2.1 Heat and temperature		10.2.2 Circuit symbols
7.2.2 Modes of heat transfer		10.2.3 Electric current and its units
7.2.3 Factors affecting heat transfer (Experimental treatment required)		10.2.4 Primary and secondary cells (simple cell, dry Leclanche' cell, Lead acid cell)
7.2.4 Applications of heat transfer on:		10.2.5 Care and maintenance of secondary cells
- Vacuum flask, - Domestic hot - water system, - Solar concentrators	8.3.0 Project Work 8.3.1 Construct Pin-hole Camera, Periscope and Kaleidoscope.	10.3.0 Project Work 10.3.1 Making a simple cell from locally available materials.
8.0.0 RECTILINEAR PROPAGATION OF LIGHT AND REFLECTION AT PLANE SURFACE (16 Lessons)	9.0.0 ELECTROSTATICS I (12 Lessons)	
8.1.0 Specific Objectives By the end of this topic, the learner should be able to:	9.1.0 Specific Objectives By the end of this topic, the learner should be able to:	
a) perform and describe experiments to show that light travels in a straight line	a) describe electrostatic charging of objects by rubbing	
b) describe the formation of shadows and eclipses	b) explain the source of electrostatic charges	
c) explain the functioning of a pin-hole camera	c) state the two types of charges	
d) state the laws of reflection	d) state the basic law of charges	
e) verify experimentally the laws of reflection	e) state the unit of charge	
	f) construct a simple leaf electroscope	
	g) explain the charging of a leaf electroscope	
	h) use a charged leaf electroscope to identify conductors, insulators and types of charges.	

FORM TWO

14.0.0 EQUILIBRIUM AND CENTRE OF GRAVITY (12 Lessons)

11.0.0 MAGNETISM (12 Lessons)

11.1.0 Specific Objectives

By the end of this topic, the learner should be able to:

- a) describe the properties and uses of magnets
- b) identify magnetic and non-magnetic materials
- c) state the basic law of magnetism
- d) describe patterns of magnetic field
- e) describe methods of magnetisation and demagnetisation using the domain theory
- f) explain magnetisation and demagnetisation using the domain theory
- g) construct a simple compass.

11.2.0 Content

- 11.2.1 Magnets: properties and uses
- 11.2.2 Magnetic and non-magnetic materials
- 11.2.3 Basic law of magnetism
- 11.2.4 Magnetic field patterns
- 11.2.5 Magnetisation and demagnetization
- 11.2.6 Domain theory of magnetism
- 11.2.7 Care of magnets
- 11.2.8 Construction of a simple compass

14.0.0 EQUILIBRIUM AND CENTRE OF GRAVITY (12 Lessons)

14.1.0 Specific Objectives

By the end of this topic, the learner should be able to:

- a) define centre of gravity
- b) determine experimentally the centre of gravity of lamina objects
- c) identify and explain the states of equilibrium
- d) state and explain factors affecting stability of an object
- e) explain the applications of stability
- f) solve numerical problems involving centre of gravity and moments of a force.

14.2.0 Content

- 14.2.1 Centre of gravity (Experimental treatment required)
- 14.2.2 States of equilibrium
- 14.2.3 Factors affecting stability
- 14.2.4 Applications of stability
- 14.2.5 Problems on centre of gravity and moments of a force (consider single pivot only)

15.0.0 REFLECTION AT CURVED SURFACES (16 Lessons)

15.1.0 Specific Objectives

By the end of this topic, the learner should be able to:

- a) define moment of a force about a point and state its SI unit
- b) state and verify the principle of moments
- c) solve problems involving the principle of moments.

12.0.0 MEASUREMENT II (16 Lessons)

12.1.0 Specific Objectives

By the end of this topic, the learner should be able to:

- a) measure length using vernier callipers and micrometer screw gauge
- b) express quantities in correct number of decimal places and correct number of significant figures

15.2.0 Content

- e) define magnification
- f) explain the applications of curved reflecting surfaces.
- 15.2.1 Concave and convex parabolic reflectors
- 15.2.2 Principal axis, principal focus, centre of curvature and related terms
- 15.2.3 Location of Images formed by curved mirrors by construction method (Experiment on concave mirrors required)
- 15.2.4 Magnification formula
- 15.2.5 Applications of curved reflectors

16.2.0 Content

- 16.2.1 Magnetic field due to a current
- 16.2.2 Oersted's experiment

16.2.3	Magnetic field patterns on straight conductors and solenoid (right hand grip rule)	b) describe transverse and longitudinal waves c) define amplitude(a), wavelength (λ), frequency (f) and periodic time(T) of a wave	20.0.9 FLUID FLOW (14 Lessons)
16.2.4	Simple electromagnets		20.1.0 Specific Objectives By the end of this topic, the learner should be able to: a) describe streamline flow and turbulent flow b) derive the equation of continuity c) describe experiments to illustrate Bernoulli's effects d) explain the Bernoulli's effect e) describe the applications of Bernoulli's effect f) solve numerical problems involving $v = f\lambda$
16.2.5	Factors affecting strength of an electromagnet		
16.2.6	Motor effect (Fleming's left hand rule)		
16.2.7	Factors affecting force on a current carrying conductor in a magnetic field (Qualitative treatment only)		
16.2.8	Applications: - electric bell, - simple electric motor		
16.3.0	Project Work		
16.3.1	Construct an electromagnet and at least one of the following: - loudspeaker - telephone receiver - electric bell - electric motor		
17.0.0	HOOKE'S LAW (8 Lessons)		
17.1.0	Specific Objectives	By the end of this topic, the learner should be able to: a) state and verify experimentally Hooke's law b) determine the spring constant c) construct and calibrate a spring balance d) solve numerical problems involving Hooke's law.	20.2.0 Content 20.2.1 Streamline and turbulent flow 20.2.2 Equation of continuity 20.2.3 Bernoulli's effect (Experimental treatment required) 20.2.4 Applications of Bernoulli's effect: Bunsen burner, spray gun, carburettor aerofoil, spinning ball Problems on equation of continuity
17.2.0	Content		
17.2.1	Hooke's law		
17.2.2	Spring constant		
17.2.3	Spring balance		
17.2.4	Problems on Hooke's Law		
18.0.0	WAVES I (14 Lessons)		
18.1.0	Specific Objectives	By the end of this topic, the learner should be able to: a) describe the formation of pulses and waves	19.2.0 Content 19.2.1 Sound: nature and sources (experimental treatment required) 19.2.2 Propagation of sound: compressions and rarefactions 19.2.3 Speed of sound by echo method 19.2.4 Factors affecting speed of sound 19.2.5 Problems on velocity of sound

FORM THREE	
21.0.0 LINEAR MOTION (20 Lessons)	22.0.0 REFRACTION OF LIGHT (20 Lessons)
21.1.0 Specific Objectives By the end of this topic, the learner should be able to:	22.1.0 Specific Objectives By the end of this topic, the learner should be able to:
a) define distance, displacement, speed, velocity and acceleration b) describe experiments to determine velocity and acceleration c) determine acceleration due to gravity d) plot and explain motion - time graphs e) applying the equations of uniformly accelerated motion f) solve numerical problems.	a) describe simple experiments to illustrate refraction of light b) state the laws of refraction of light c) verify Snell's law d) define refractive index e) determine experimentally the refractive index f) describe experiments to illustrate dispersion of white light g) explain total internal reflection and its effects h) state the applications of total internal reflection i) solve numerical problems involving refractive index and critical angle.
21.2.0 Content 2.1.2.1 Distance, displacement, speed, velocity, acceleration (Experimental treatment required)	22.2.0 Content 22.2.1 Refraction of light - laws of refraction (Experimental treatment required)
21.2.2 Acceleration due to gravity: - free-fall, - simple pendulum method (experimental treatment required)	22.2.2 Determination of refractive index: - Snell's law, - real/apparent depth, - critical angle
21.2.3 Motion-time graphs: - Displacement - time graphs, - Velocity - time graphs (Experimental treatment required)	22.2.3 Dispersion of white light Experimental treatment required
21.2.4 Equations of uniformly accelerated motion	22.2.4 Total internal reflection and its effects: critical angle Applications of total internal reflection: - Prism periscope, - Optical fibre
21.2.5 Problems on uniformly accelerated motion	22.2.5 Problems on refractive index and critical angle
23.0.0 NEWTON'S LAWS OF MOTION (15 Lessons)	
23.1.0 Specific Objectives By the end of this topic, the learner should be able to:	
a) state Newton's laws of motion b) describe simple experiments to illustrate inertia c) state the law of conservation of linear momentum d) define elastic collision, inelastic collision and impulse e) derive the equation $F = ma$ f) describe the application of frictional force g) define viscosity h) explain terminal velocity i) solve numerical problems involving Newton's laws and the law of conservation of linear momentum.	
23.2.0 Content 23.2.1 Newton's laws of motion (Experimental treatment on inertia required)	
23.2.2 Conservation of linear momentum: elastic collisions, inelastic collisions, recoil velocity, impulse (oblique collisions not required).	
23.2.3 F = ma. 23.2.4 Frictional forces: Static and dynamic friction - advantages and disadvantages, - viscosity, - terminal velocity (qualitative treatment).	
23.2.5 Problems on Newton's Laws and law of conservation of linear momentum (exclude problems on elastic collisions)	
24.0.0 WORK, ENERGY, POWER AND MACHINES (20 Lessons)	
24.1.0 Specific Objectives By the end of this topic, the learner should be able to:	
a) describe energy transformations c) state the law of conservation of energy d) define work, energy, power and state their SI units e) define mechanical advantage, velocity ratio and efficiency of machines f) solve numerical problems involving work, energy, power and machines.	
24.2.0 Content 24.2.1 Forms of energy and energy transformations Sources of energy: - renewable, - non-renewable	
24.2.2 Law of conservation of energy Work, energy and power (work done by resolved force not required)	
24.2.5 Kinetic and potential energy 24.2.6 Simple machines 24.2.7 Problems on work, energy, power and machines	
24.3.0 Project Work Construct an energy saving jiko and a solar heater	
25.0.0 CURRENT ELECTRICITY (20 Lessons)	
25.1.0 Specific Objectives By the end of this topic, the learner should be able to:	
a) define potential difference and state its units b) measure potential difference and current in a circuit c) verify Ohm's law d) define resistance and state its unit e) determine experimentally the voltage - current relationships for various conductors	

- f) define emf and explain internal resistance of a cell
g) derive the formulae for effective resistance of resistors in series and in parallel
j) solve numerical problems involving ohm's law, resistors in series and in parallel.
- 25.2.0 Content**
- 25.2.1 Scale reading: Ammeter, Voltmeter
25.2.2 Electric circuits: current, potential difference
25.2.3 Ohm's law (experimental treatment required)
25.2.4 Resistance: types of resistors, measurements of resistance and units.
25.2.5 Electromotive force (emf) and internal resistance of a cell ($E = V + Ir$)
25.2.6 Resistors in series and in parallel
25.2.7 Galvanometers: Conversion to ammeters and voltmeters
25.2.9 Problems on Ohm's law, resistors in series and in parallel
- 26.0.0 WAVES II (10 Lessons)**
- 26.1.0 Specific Objectives**
- By the end of this topic the learner should be able to:
- a) describe experiments to illustrate the properties of waves
 - b) sketch wave fronts to illustrate the properties of waves
 - c) explain constructive interference and destructive interference
 - d) describe experiments to illustrate stationary waves.
- 26.2.0 Content**
- 26.2.1 Properties of waves including sound waves: reflection, refraction, diffraction, interference (Experimental
- treatment required)
- 26.2.2 Constructive interference and destructive interference (qualitative treatment only)
- 26.2.3 Stationary waves (qualitative and experimental treatment required)
- 27.0.0 ELECTROSTATICS II (15 Lessons)**
- 27.1.0 Specific Objectives**
- By the end of this topic, the learner should be able to:
- a) sketch electric field patterns around charged bodies
 - b) describe charge distribution on conductors of various shapes
 - c) define capacitance and state its SI unit
 - d) describe charging and discharging of a capacitor (calculation involving curves not required)
 - e) state the factors affecting the capacitance of a (parallel) plate capacitor
 - f) state the applications of capacitors
 - g) solve numerical problems involving capacitors.
- 27.2.0 Content**
- 27.2.1 Electric field patterns
27.2.2 Charge distribution on conductors: spherical and pear shaped conductors
- 27.2.3 Action at points: lightning arrestors**
- 27.2.4 Capacitance, unit of capacitance (farad, microfarad), factors affecting capacitance
27.2.5 Applications of capacitors
27.2.6 Problems on capacitors {using $Q=CV$, $C_T=C_1+C_2$,
- $$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2}$$

- 28.0.0 HEATING EFFECT OF AN ELECTRIC CURRENT (10 Lessons)**
- 28.1.0 Specific Objectives**
- By the end of this topic, the learner should be able to:
- a) Perform and describe experiments to illustrate heating effect of an electric current
 - b) state the factors affecting heating by electric current
 - c) derive the equations for electrical energy and electrical power
 - d) identify devices in which heating effect of an electric current is applied
 - e) solve numerical problems involving electrical energy and electrical power.
- 28.2.0 Content**
- 28.2.1 Simple experiments on heating effect
28.2.2 Factors affecting electrical energy, $W = VIt$, $P = VI$
- 29.0.0 QUANTITY OF HEAT (20 Lessons)**
- 29.1.0 Specific Objectives**
- By the end of this topic, the learner should be able to:
- a) state the gas laws for an ideal gas
 - b) verify experimentally the gas laws
 - c) explain how the absolute zero temperature may be obtained from the pressure - temperature graphs
 - d) convert Celsius scale to Kelvin of temperature
 - e) state the basic assumptions of the kinetic theory of gases
- 29.2.0 Content**
- 29.2.1 Heat capacity, specific heat capacity, units (Experimental treatment required)
- 29.2.2 Latent heat of fusion, latent heat of vaporization, units (Experimental treatment necessary)
- 29.2.3 Boiling and melting
29.2.4 Pressure cooker, refrigerator
29.2.5 Problem on quantity of heat ($Q = MCA\theta$, $Q = Mf$)
- 29.3.0 Project Work**
- Construct a charcoal refrigerator (cooler)
- 29.4.0 GAS LAWS (15 Lessons)**
- 30.1.0 Specific Objectives**
- By the end of this topic, the learner should be able to:
- a) state the gas laws for an ideal gas
 - b) verify experimentally the gas laws
 - c) explain how the absolute zero temperature may be obtained from the pressure - temperature graphs
 - d) convert Celsius scale to Kelvin of temperature
 - e) state the basic assumptions of the kinetic theory of gases

- f) explain the gas laws using the kinetic theory of gases
g) solve numerical problems involving gas laws.

30.2.0 Content

- 30.2.1 Boyle's law, Charles' law, pressure law, absolute zero
30.2.2 Kelvin scale of temperature
30.2.3 Gas laws and kinetic theory of gases $P = \frac{1}{3}p\bar{c}$ (not required)
30.2.4 Problems on gas laws
[including $\frac{PV}{T} = \text{constant}$]

FORM FOUR

31.0.0 THIN LENSES (20 Lessons)

31.1.0 Specific objectives

By the end of this topic, the learner should be able to:

- a) describe converging lenses and diverging lenses
- b) describe using ray diagrams the principal focus, the optical centre and the focal length of a thin lens
- c) determine experimentally the focal length of a converging lens
- d) locate images formed by converging lens
- e) describe the characteristics of images formed by thin lenses
- f) explain image formation in the human eye
- g) describe the defects of vision in the human eye and how they can be corrected
- h) describe the use of lenses in various optical devices
- i) solve numerical problems involving the lens formula and the magnification formula.

31.3.0 Project work

Construct a telescope.

31.2.0 UNIFORM CIRCULAR MOTION (10 Lessons)

32.1.0 Specific Objectives

By the end of this topic, the learner should be able to:

- a) define angular displacement and angular velocity
- b) describe simple experiments to illustrate centripetal force
- c) explain the applications of uniform circular motion
- d) solve numerical problems involving uniform circular motion.

32.2.0 Content

32.2.1 The radian, angular displacement, angular velocity

32.2.2 Centripetal force;

$$F = \frac{mv^2}{r}, \quad F = m\omega^2 r$$

(derivation of formulae not required) (experimental treatment is necessary)

- 32.2.3 Applications of uniform circular motion
- 32.2.4 Centrifuge, vertical, horizontal circles, banked tracks (calculations on banked tracks)

and conical pendulum not required)	c) describe the methods of detecting electromagnetic radiations
32.2.5 Problem solving (Apply $F = \frac{mv^2}{r}$, $F = m\omega^2 r$)	d) describe the applications of electromagnetic radiations
33.0.0 FLOATING AND SINKING (15 Lessons)	e) solve numerical problems involving $c = fA$.
33.1.0 Specific Objectives	By the end of this topic, the learner should be able to: a) state Archimedes' principle b) verify Archimedes' principle c) state the law of flotation d) define relative density e) describe the applications of Archimedes' principle and relative density. f) Solve numerical problems involving Archimedes' principle.
34.2.0 Content INDUCTION (20 Lessons)	34.2.1 Electromagnetic spectrum 34.2.2 Properties of electromagnetic waves 34.2.3 Detection of electromagnetic (e.m.) radiations 34.2.4 Applications of e.m. radiations (include greenhouse effect) 34.2.5 Problems involving $c = fA$
35.2.0 Content INDUCTION (20 Lessons)	35.2.1 Simple experiments to illustrate electromagnetic induction 35.2.2 Induced emf: - Faraday's law, - Lenz's law
36.3.0 Excursion 36.3.1 Field trip to a power station is recommended.	36.3.1 Field trip to a power station is recommended.
35.2.0 Content CATHODE RAYS AND CATHODE RAY TUBE (10 Lessons)	35.2.3 Mutual induction 35.2.4 Alternating current generator, direct current generator Fleming's right hand-rule Transformers 35.2.6 Applications of electromagnetic induction: - induction coil, - moving coil loudspeaker 35.2.8 Problems on transformers
37.0.0 CATHODE RAYS AND CATHODE RAY TUBE (10 Lessons)	37.1.0 Specific Objectives By the end of this topic, the learner should be able to: a) describe the production of cathode rays b) state the properties of cathode rays c) explain the functioning of a Cathode Ray Oscilloscope (C.R.O.) and of a Television tube (T.V. tube) 37.1.1 Production of cathode rays, cathode ray tube 37.1.2 Properties of cathode rays 37.1.3 C.R.O. and T.V. tubes 37.1.4 Uses of C.R.O. 37.1.5 Problems on C.R.O.
37.2.0 Content CATHODE RAYS (8 Lessons)	37.2.1 Construction of a simple transformer. 37.2.2 Problems on C.R.O.
36.0.0 MAINS ELECTRICITY (10 Lessons)	36.1.0 Specific Objectives By the end of this topic, the learner should be able to: a) perform and describe simple experiments to illustrate electromagnetic induction b) state the factors affecting the magnitude and the direction of the induced emf c) state the laws of electromagnetic induction d) describe simple experiments to illustrate mutual induction e) explain the working of an alternating current (a.c.) generator and a direct current (d.c.) generator f) explain the working of a transformer g) explain the applications of electromagnetic induction h) solve numerical problems involving transformers.
38.0.0 X-RAYS (8 Lessons)	38.1.0 Specific Objectives By the end of this topic, the learner should be able to: a) explain the production of X-rays b) state the properties of X-rays c) state the dangers of X-rays d) explain the uses of X-rays e) solve numerical problems involving X-rays.
37.2.0 Content PROBLEMS ON MAINS ELECTRICITY (15 Lessons)	37.2.1 Sources of mains electricity 37.2.2 Power transmission (include dangers of high voltage transmission) 37.2.3 Domestic wiring system 37.2.4 Kw-hr, consumption and cost of electrical energy 37.2.5 Problems on mains electricity
34.1.0 Specific Objectives	By the end of this topic, the learner should be able to: a) describe the complete electromagnetic spectrum b) state the properties of electromagnetic waves

38.2.0 Content	39.2.5 Applications of photoelectric effect:	41.0.0 ELECTRONICS (10 Lessons)
38.2.1 Production of X-rays, X-ray tube	- photo emissive, - photo conductive, - photovoltaic cells	41.1.0 Specific Objectives By the end of this topic, the learner should be able to: a) state the differences between conductors and insulators b) define intrinsic and extrinsic semi-conductors c) explain doping in semi-conductors d) explain the working of a p-n junction diode e) sketch current-voltage characteristics for a diode f) explain the application of diodes in rectification.
38.2.2 Energy changes in an X-ray tube	39.2.6 Problems on photoelectric emissions	41.2.0 Content Conductors, semi-conductors, insulators Intrinsic and extrinsic semi-conductors Doping p-n junction diode Applications of diodes: half wave rectification and full-wave rectification
38.2.3 Properties of X-rays, soft X-rays and hard X-rays		41.3.0 Project Work Construct a simple radio receiver
38.2.4 Dangers of X-rays and precautions		41.3.1 Construct a simple radio receiver
38.2.5 Uses of X-rays (Bragg's law not required)	39.3.0 Project Work 39.3.1 Construct a burglar alarm.	
38.2.6 Problems on X-rays		
39.0.0 PHOTOELECTRIC EFFECT (15 Lessons)	40.0.0 RADIO ACTIVITY (15 Lessons)	
39.1.0 Specific Objectives By the end of this topic, the learner should be able to: a) perform and describe simple experiments to illustrate the photoelectric effect b) explain the factors affecting photoelectric emission c) apply the equation $E = hf$ to calculate the energy of photons d) define threshold frequency, work function and the electron volt e) explain photoelectric emission using Einstein equation $(hf = hf_0 + \frac{1}{2}mv^2)$ f) explain the applications of photoelectric effect g) solve numerical problems involving photoelectric emissions.	40.1.0 Specific Objectives By the end of this topic, the learner should be able to: a) define radioactive decay and half-life b) describe the three types of radiations emitted in natural radioactivity c) explain the detection of radioactive emissions d) define nuclear fission and fusion e) write balanced nuclear equations f) explain the dangers of radioactive emissions g) state the applications of radioactivity h) solve numerical problems involving half-life.	40.2.0 Content Detectors of radiation, Nuclear fission, nuclear fusion Radioactive decay Half-life Nuclear equations Hazards of radioactivity, precautions Applications Problems on half-life (integration not required)
39.2.0 Content		
39.2.1 Photoelectric effect, photons, threshold frequency; work function, Planck's constant, and electron-volt	40.2.4 Detectors of radiation, Nuclear fission, nuclear fusion 40.2.5 Radioactive decay 40.2.6 Nuclear equations 40.2.7 Hazards of radioactivity, precautions	
39.2.2 Factors affecting photoelectric emission	40.2.8 Applications 40.2.9 Problems on half-life	
39.2.3 Energy of Photons		
39.2.4 Einstens equation $hf = hf_0 + \frac{1}{2}mv^2$		

CHEMISTRY

INTRODUCTION

GENERAL OBJECTIVES

Chemistry as a subject is introduced to the learners for the first time at secondary school level. The knowledge of chemistry is necessary in the understanding of the composition, properties and behaviour changes of matter that form the environment around us.

This syllabus presents chemistry as a practical subject where scientific concepts, principles and skills are developed through experimental investigations. The learning of scientific knowledge by discovery method is encouraged.

The topics and content have been carefully selected and logically organised to facilitate step by step realization of the expected behavioural changes. The specific objectives in every topic will guide the teacher and the learner on the depth of treatment of content. The learning/teaching experiences have been appropriately chosen to ensure proper development of the cognitive, psychomotor and affective skills.

The syllabus emphasises the use of International Units for Physical and Applied Chemistry (IUPAC) system of nomenclature, correct use of chemical terminologies and equations.

There are applications and projects at the end of most of the topics to enable the learners link the subject with the physical environment around them. The learners would use the opportunities to interact with the physical and chemical processes, which take place within the local environment. The projects are meant to enhance creativity, critical thinking and ability to make logical decisions. The projects also make the learners aware of the effect of scientific knowledge in everyday life and thus able to appreciate their responsibility to the society.

The projects given are only examples. Teachers can come up with their own. The learners are also encouraged to initiate their own projects based on the scientific principles so far learnt. This creates interest, curiosity and fun in the learning of the subject.

Most of the apparatus, chemicals and equipment required for carrying out experiments are basic and affordable by most schools. Improvisation and use of local materials is encouraged where necessary to cut down on costs.

The suggested time is only a guide on how long each topic is expected to take.

By the end of the course, the learner should be able to:

1. select and handle appropriate apparatus for use in experimental work
2. make accurate measurements, observations and draw logical conclusions from experiments
3. observe and appreciate the need for safety precautions during experimental investigations
4. understand and appreciate the use of chemical symbols and formulae in writing equations
5. use appropriate chemical terms in describing physical and chemical processes
6. identify patterns in the physical and chemical behaviour of substances
7. apply the knowledge acquired to promote positive environmental and health practices
8. use the knowledge and skills acquired to solve problems in everyday life
9. apply principles and skills acquired in technological and industrial development
10. acquire adequate knowledge in chemistry for further education and for training.

FORM ONE	
1.0.0	INTRODUCTION TO CHEMISTRY (12 Lessons)
1.1.0	<p>Specific Objectives</p> <p>By the end of this topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) recall the topics related to chemistry taught at primary school level b) explain what the study of chemistry is about c) name and state the uses of common apparatus in the laboratory d) describe a Bunsen burner and its flame e) state laboratory safety rules.
1.2.0	Content
	Review the following topics
	<ul style="list-style-type: none"> - properties of matter - states of matter - mixtures and their separations - conductors and non-conductors of electricity - Mention of drugs (prescription, dosage and abuse)
1.2.2	Chemistry and the Society
	<ul style="list-style-type: none"> • Definition of chemistry and its role in the society
1.2.3	Chemistry laboratory
	<ul style="list-style-type: none"> • heating apparatus (Bunsen burner, spirit lamp, candle, gas or kerosene stove and electric heater) • parts of a Bunsen burner and its flame • measuring apparatus (volume, temperature, mass, time) • other apparatus (glass ware, spatula, deflating spoon, crucible, wire gauze etc.) • laboratory safety rules.
2.0.0	SIMPLE CLASSIFICATION OF SUBSTANCES (32 Lessons)
2.1.0	<p>Specific Objectives</p> <p>By the end of this topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) carry out simple experiments to obtain pure substances from mixtures b) state the criteria for identifying a pure substance c) define and determine the melting point and boiling point of a substance d) explain the three states of matter (solid, liquid, gas) in terms of a simplified form of the kinetic theory e) state the effect of heat on a variety of substances f) distinguish between permanent and non-permanent changes g) define an element, a compound, an atom and a molecule h) name and write the chemical symbols of common elements i) recognize the constituents of matter from given examples j) distinguish between mixtures and compounds k) apply separation techniques to extract various substances from natural sources.
2.2.0	Content
	Separation of Mixtures
	<ul style="list-style-type: none"> • Filtration, evaporation and condensation • Distillation (simple and fractional), chromatography, solvent extraction as a method of extracting oil from nut seeds, crystallization, separation by using separating
2.2.1	
2.2.2	Effect of heat on substances
	<ul style="list-style-type: none"> • States of matter (solid, liquid, gases); The Kinetic theory • Melting and boiling, condensation and evaporation of liquids in terms of kinetic theory • Permanent and non-permanent changes (illustrate using iodine, wax, copper(II) sulphate crystals, potassium manganate(VII), zinc(II) oxide etc.)
2.2.3	Constituents of matter
	<ul style="list-style-type: none"> • Elements, atoms, molecules and compounds • Names and symbols of common elements • Simple word equations
2.2.4	Applications
	<ul style="list-style-type: none"> • Fractional distillation of crude oil (e.g. Changamwe oil refinery) and liquid air, salt extraction e.g. Magadi Soda Company and Ngomeni; removal of stains from fabrics (dry cleaning); obtaining cream from milk.
2.3.0	Projects
	<ul style="list-style-type: none"> • extraction of natural dyes, medicines and oils from plants • construction and use of a fractionating column
3.0.0	ACIDS, BASES AND INDICATORS (16 Lessons)
3.1.0	Specific Objectives
	<p>By the end of this topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) prepare and use plant extracts as acid-base indicators b) use indicators to identify acids and bases c) state simple properties of acids and bases d) name uses of acids and bases e) state effects of acids on substances.
3.2.0	Content
	Acid/Base indicators
	<ul style="list-style-type: none"> • Plant - extracts as simple acid-base indicators • Common acid-base indicators, universal indicator and pH scale • Acidic, neutral and basic/alkaline solutions illustrated by the use of the following examples; water, aqueous solution/suspension; lemon juice, soap, wood ash, baking powder, anti-acid tablets and powders, toothpaste, sour milk, ammonia, ammonium sulphate, sodium chloride, sodium hydroxide, carbon(IV) oxide, sulphur(IV) oxide, sulphuric acid, hydrochloric acid, nitric acid, calcium hydroxide and magnesium oxide.
3.2.1	
3.2.2	Simple properties of acids and bases:
	<ul style="list-style-type: none"> • Reaction of dilute acids with metals, metal oxides, hydroxides, carbonates and hydrogencarbonates • Effects of acids on substances
3.2.3	Applications
	<ul style="list-style-type: none"> • Uses of acids and bases
3.3.0	Projects
	<ul style="list-style-type: none"> • Investigate various plant extracts and use them as acid/base indicators

4.0.0	AIR AND COMBUSTION (24 Lessons)	<ul style="list-style-type: none"> Quantitative determination of oxygen in air using copper, iron filings and burning candle. Burning of substances in air; carbon, sulphur, phosphorus (CARE), sodium and copper Oxygen as an active part of air (mass changes involved) Fractional distillation of liquefied air Rusting: conditions, composition and prevention
4.1.0	Specific Objectives	<p>By the end of this topic, the learner should be able to:</p> <ol style="list-style-type: none"> state the percentage composition of air by volume carry out simple experiments to show that oxygen is the active part of air determine the percentage of oxygen in air using suitable methods describe the combustion of specified elements in air and oxygen and name the products explain how liquefied air can be separated into its components by fractional distillation carry out experiments to investigate the conditions for rusting, and state the composition of rust state methods of preventing rusting prepare oxygen, investigate its properties and state its uses arrange some elements in order of their reactivity with oxygen using experimental data classify the products of burning elements in oxygen either as acidic or basic state pollution effects due to burning of substances in air state the uses of reactivity series.
4.2.0	Content	<p>4.2.1 Composition of air</p> <ul style="list-style-type: none"> Approximate percentage of nitrogen and oxygen in air by volume (mention of carbon dioxide and noble gases as other constituents of air)
4.3.0	Projects	<p>Determination of oxygen in water from different sources. Investigate industrial processes of large scale oxygen production (e.g. the British Oxygen Company (BOC) Kenya Limited).</p>
4.2.4	Application	<p>Extraction of metals (use the concept of reactivity series only)</p>
5.2.0	Content	<p>5.2.1 Water</p> <ul style="list-style-type: none"> Sources of water: Burning of organic matter e.g. burning candle in air (test for carbon(IV) oxide and water vapour using calcium

4.2.2	Oxygen	<ul style="list-style-type: none"> Laboratory preparation of oxygen using 20 volume by volume (v/v) hydrogen peroxide with manganese(IV) oxide or reaction of sodium peroxide with water (relate methods of collection to the properties of the gas) Properties; physical and chemical Combustion of elements in oxygen (metals and non-metals) competition for combined oxygen illustrated by the reaction of magnesium with carbon(IV) oxide, lead(II) oxide and copper(II) oxide Mention atmospheric pollution due to burning in oxygen
4.2.3	Reactivity Series	<ul style="list-style-type: none"> order of reactivity of elements from reaction with oxygen: potassium, sodium, calcium, magnesium, aluminium, carbon, zinc, iron, lead and copper. (It is not possible to establish full series practically) Uses: oxy-acetylene in welding, life support functions
4.3.0	Project	<p>Identification of common pollutants of water from local sources and suggesting their control</p>
5.2.2	Hydrogen	<ul style="list-style-type: none"> Laboratory preparation of hydrogen by reacting a metal with a dilute acid. (relate methods of collection to properties of the gas). Test for hydrogen Properties; physical and chemical Oxidation and reduction (oxygen gain and removal only) e.g. in metal oxide-hydrogen reaction. (Caution: experiments involving the burning of hydrogen gas are explosive). Uses (manufacture of margarine, rocket fuels, ammonia, hydrochloric acid, Oxy-hydrogen flame for welding and weather balloons.
5.3.0	Project	<p>Identification of common pollutants of water from local sources and suggesting their control</p>

FORM TWO			
9.0	STRUCTURE OF THE ATOM AND THE PERIODIC TABLE (24 Lessons)	6.2.1 Content The Structure of the Atom	<ul style="list-style-type: none"> Names and symbols of the first twenty elements of the periodic table. Simple structure of the atom; protons, electrons and neutrons; electron energy levels in atoms.
1.0	Specific Objectives	<p>By the end of this topic, the learner should be able to:</p> <ol style="list-style-type: none"> name and write the chemical symbols of the first twenty elements of the periodic table describe the structure of the atom and write the electron arrangement of the first twenty elements of the periodic table explain the electron arrangement of the atom in terms of energy levels define atomic number, mass number, isotopes and relative atomic mass calculate the relative atomic masses from isotopic composition explain the position of an element in the periodic table in terms of the electron arrangement define valency and oxidation number of an element predict the type of ion formed from a given electron arrangement of an atom predict the valencies and oxidation numbers from position of elements in the periodic table derive the formulae of some simple compounds from valencies of elements and radicals write simple balanced chemical equations. 	<ul style="list-style-type: none"> Atomic characteristics Definitions of atomic number, mass number, isotopes and relative atomic mass (reference C-12); examples of isotopes Calculations of relative atomic mass from relative abundance of isotopes of an element Build up of the periodic table for the first twenty elements on the basis of energy levels <ul style="list-style-type: none"> - rows (periods) - columns (groups) The periodic table
6.3.0	Project	<ul style="list-style-type: none"> Atomic model construction Note: The use of chemical equations with state symbols should be emphasised henceforth 	7.2.0
7.0.0	CHEMICAL FAMILIES: PATTERNS IN PROPERTIES (28 Lessons)	<p>By the end of this topic, the learner should be able to:</p> <ol style="list-style-type: none"> identify alkali metals, alkaline-earth metals, halogens and noble gases in the periodic table and write their electron arrangement state and explain trends in physical properties of alkali metals, alkaline-earth metals, halogens and noble gases state and explain the trends in reactivity of the alkali metals, alkaline-earth metals and halogens explain the similarities in formulae of compounds formed by alkali metals, alkaline-earth metals and halogens state the uses of alkali metals, alkaline-earth metals, halogens and noble gases explain the unreactive nature of the noble gases in terms of their electron arrangement 	7.2.2
7.1.0	Specific Objectives	<p>By the end of this topic, the learner should be able to:</p> <ol style="list-style-type: none"> identify alkali metals, alkaline-earth metals, halogens and noble gases in the periodic table and write their electron arrangement state and explain trends in physical properties of alkali metals, alkaline-earth metals, halogens and noble gases state and explain the trends in reactivity of the alkali metals, alkaline-earth metals and halogens explain the similarities in formulae of compounds formed by alkali metals, alkaline-earth metals and halogens state the uses of alkali metals, alkaline-earth metals, halogens and noble gases explain the unreactive nature of the noble gases in terms of their electron arrangement 	7.2.2
7.2.0	Alkaline - earth metals (Group 2)	<ul style="list-style-type: none"> (Beryllium, magnesium, and calcium) Electron arrangement, gradation in size of atom, ion and trends of ionisation energy Physical properties; appearance, melting point, boiling point, thermal and electrical conductivity Reaction with air, water, chlorine and dilute acids. <p>(Caution: Reaction between calcium and acid is violent. Use very dilute acid)</p>	7.2.1
7.2.1	Content	<ul style="list-style-type: none"> Similarity of ions and formulae of hydroxides, oxides and chlorides of alkali metals Uses of alkali metals (sodium only). 	
7.2.2	Alkaline - earth metals (Group 2)	<ul style="list-style-type: none"> Similarity of ions and formulae of hydroxides, oxides and chlorides of alkali metals Reaction with air, water and chlorine. Physical properties; appearance, melting point, boiling point, thermal and electrical conductivity Reaction with air, water and chlorine. 	
7.2.3	Content	<ul style="list-style-type: none"> Similarity of ions and formulae of hydroxides, oxides and chlorides of alkali metals Reaction with air, water and chlorine. Physical properties; appearance, melting point, boiling point, thermal and electrical conductivity Reaction with air, water and chlorine. 	
7.2.4	Ion formation	<ul style="list-style-type: none"> Formation of simple ions (cations and anions): qualitative treatment of the ionisation energy and electron affinity. Writing of the electron arrangement of ions formed from atoms; lithium, sodium, fluorine, chlorine, aluminium, magnesium and Sulphur; definition of valency and oxidation numbers. Derive valency and oxidation number of an element from atoms; its position in the periodic table Names and formulae of common radicals Use of valencies in determining the chemical 	

7.2.3	Halogens (Group 7); (Fluorine, chlorine, bromine and iodine);	7.3.0	Project	<ul style="list-style-type: none"> Construction of models of the Periodic table
	<ul style="list-style-type: none"> Electron configuration of fluorine and chlorine. gradation in size of atoms and ions Physical properties (appearance, melting point, boiling point, thermal and electrical conductivity) Reaction with metals, sodium, zinc, iron and water Similarity of ions and formulae of compounds Importance of fluorine, chlorine, bromine and iodine 	8.0.0	STRUCTURE AND BONDING (20 Lessons)	
		8.1.0	Specific Objectives	<p>By the end of this topic, the learner should be able to:</p> <ul style="list-style-type: none"> describe the role of the outer electrons in determining chemical bonding explain qualitatively the formation of covalent and ionic bonds illustrate the covalent and ionic bonds using diagrams explain the unique nature of the metallic bonding state the effect of intermolecular forces of attraction on physical properties of substances distinguish between bond types on the basis of physical properties of substances compare and explain the changes in bond type across a period select appropriate materials for use based on bond type.
	<p>7.2.4 Noble gases (group 8); (Helium, neon, argon)</p> <ul style="list-style-type: none"> Electron arrangement and gradation in size of atoms Electron arrangement - the basis of low reactivity of helium, neon and argon Importance of noble gases 	7.2.5	Properties and trends across a period	<ul style="list-style-type: none"> Period three elements (sodium, magnesium, aluminium, silicon, phosphorus, sulphur, chlorine and argon) Electron arrangement of the elements Physical properties of period three elements (atomic size, ionisation energy, melting point, boiling point, thermal and electrical conductivity) Reaction of period three elements with oxygen, water and dilute acids
		8.2.0	Content	<p>8.2.1 The role of outer electrons in chemical bonding</p> <ul style="list-style-type: none"> significance of the outer electrons in chemical bonding. the noble gas electron arrangement electron transfer and ionic bonding electron sharing and covalent bonding use dot (.) and cross (x) diagrams to illustrate bonding, electrostatic forces of attraction in the following: molecular (iodine), giant <p>(Caution: Reaction of sodium with acids is explosive. Give theoretical treatment only)</p>

c)	write ionic equations for the preparation of salts
d)	state types of salts
e)	identify soluble and insoluble salts
f)	describe and explain from experimental observations the action of heat on various salts
g)	state uses of some salts.
	Content
	Methods of preparing salts
	<ul style="list-style-type: none"> preparation of soluble salts by reaction of acids with: metals, metal hydroxides, metal oxides, metal carbonates and metal hydrogen carbonates preparation of insoluble salts by precipitation (ionic equations required) direct combination reaction (e.g. sodium with chlorine, iron with sulphur) Types of salts; normal, acid and double salts.
9.2.0	9.2.1 Types of bonds across a period (period 3)
	<ul style="list-style-type: none"> Changes in types of chemical bonds in oxides and chlorides of sodium, magnesium, aluminium, silicon, phosphorous, Sulphur and chlorine.
8.2.2	9.2.2 Solubility of salts
	<ul style="list-style-type: none"> Solubility of sulphates, chlorides, nitrates and carbonates in water Relationship between method of preparation and solubility <p>Note: The solubility of hydroxides and oxides should be considered along with others</p>
9.2.3	9.2.3 Applications
	<p>Selection of materials for various uses; e.g. diamond, graphite and aluminium</p> <p>Project Investigation of materials in terms of their structure and bonding.</p>
9.0.0	SALTS (20 Lessons)
	<p>9.1.0 Specific Objectives</p> <p>By the end of this topic, the learner should be able to:</p> <ul style="list-style-type: none"> select and use appropriate methods of preparing particular salts explain the terms saturated solution, crystallisation, neutralisation and precipitation
9.2.3	Action of heat on salts
	<ul style="list-style-type: none"> Effects of heat on the following salts; carbonates, nitrates, sulphates and hydrated salts (include ammonium salts) Applications <ul style="list-style-type: none"> - use of lime to change soil pH - use of salts as anti - acids - use of salts as inorganic fertilizers

9.2.4 Project
Analysing anti-acid drugs.

- Ions as the particles in electrolyte solutions and melts
- Molecules as the particles in non-electrolyte solutions and melts

10.0.0 EFFECT OF AN ELECTRIC CURRENT ON SUBSTANCES (16 Lessons)**10.1.0 Specific objectives**

By the end of this topic, the learner should be able to:

- define the terms conductor and non-conductor; electrolyte and non-electrolyte
- classify solutions and molten substances as electrolytes and non-electrolytes
- distinguish between electrolytes and non-electrolytes in terms of the particles they contain
- explain the process of electrolysis and define the terms anode and cathode
- state the products of electrolysis of a binary electrolyte
- state some applications of electrolysis.

10.2.0 Content

- Conductors and non-conductors
- Test for conduction of electricity by:
 - Solids, metals and non-metals; (wood, aluminium foil, sodium chloride, sugar and lead(II) bromide)
 - aqueous solutions of: sugar, urea, copper(II) chloride, sodium chloride and mineral acids.
 - melts: Sulphur, lead(II) bromide or lead(II) iodide and sugar
 - Electrolytes and non-electrolytes

10.2.1 Conduction of electricity

- Conductors and non-conductors

10.2.2 Electrolysis

- Passage of a direct electric current through an electrolyte (electrolysis of molten lead(II) bromide or lead(II) iodide)
- Anode and cathode
- Applications of electrolysis
 - electroplating
 - production and purification of metals

11.0.0 CARBON AND SOME OF ITS COMPOUNDS (20 Lessons)**11.1.0 Specific Objectives**

By the end of this topic, the learner should be able to:

- define allotropy and allotropes
- explain the physical properties of the carbon allotropes in terms of bonding and how the properties are related to the uses of the allotropes
- describe some chemical properties of carbon
- describe laboratory preparation and properties of carbon (IV) Oxide (Carbon dioxide)
- state and explain the physical and chemical properties of carbon(IV) Oxide (Carbon dioxide)
- describe laboratory preparation and some properties of Carbon (II) Oxide (Carbon monoxide)
- describe the chemical reactions of carbonates and hydrogen carbonates

11.2.5 Carbonates and hydrogen carbonates

- Action of heat and dilute acids on some carbonates and hydrogen carbonates
 - Production and manufacture of sodium carbonate (Magadi Soda Company and solvay process)
- Note:** Use simple schematic diagrams to illustrate solvay process.

11.2.1 Content

- Diamond, graphite and charcoal: structure, physical properties and uses (relate uses to structure and physical properties)

11.2.2 Chemical properties of carbon

- Consider combustion, reaction with acids and reducing action required at this level
- Reactions of the gas with water, calcium hydroxide and alkalis.

11.2.3 Preparation and properties of Carbon (IV) oxide (carbon dioxide)

- (Relate methods of collection to the properties of the gas)
- Reactions of the gas with
 - water, calcium hydroxide and alkalis.
 - Uses of carbon(IV) oxide (carbon dioxide)

11.2.4 Preparation and properties of carbon(II) oxide (carbon monoxide)

- Preparation of carbon(II) oxide (carbon monoxide).
 - Physical properties
 - Chemical properties;
 - Combustion, reducing action, poisonous nature such as car exhausts fumes and charcoal fire
- Note:** only theoretical treatment required because of its poisonous nature

11.2.5 Carbonates and hydrogen carbonates

- Action of heat and dilute acids on some carbonates and hydrogen carbonates
- Production and manufacture of sodium carbonate (Magadi Soda Company and solvay process)

Note: Use simple schematic diagrams to illustrate solvay process.**11.2.6 Importance of carbon and its oxides**

- Carbon cycle
- Soft drinks manufacture
- Fire extinguishers
- The effects of Carbon(IV) oxide (carbon dioxide) and carbon(II) oxide (carbon monoxide) on the environment

11.3.0 Projects

- Construction and use of simple fire extinguishers
- construction of carbon cycle chart.

FORM THREE

<p>12.0.0 GAS LAWS (15 lessons)</p> <p>12.1.0 Specific Objectives By the end of this topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) state Boyle's and Charles' laws b) carry out calculations involving the gas laws c) use combined gas law in calculations d) state Graham's law of diffusion e) explain diffusion in liquids and gases in terms of kinetic theory f) relate the rate of diffusion to the relative molecular mass of a gas. <p>Note: Use of SI units should be emphasised</p> <p>12.2.0 Content</p> <p>12.2.1 Boyle's law and Charles' law</p> <ul style="list-style-type: none"> • Boyle's law, Charles' law and combined gas laws • Explanation of the laws (use graphs to illustrate) • Calculations involving gas laws <p>Note: Use of SI units should be emphasised</p> <p>12.2.2 Grahams' law of diffusion</p> <ul style="list-style-type: none"> • Graham's law of diffusion; experiments illustrating diffusion of bromine gas, dissolving of copper(II) sulphate crystals or potassium manganate(VII) crystals in water. Explain diffusion in terms of kinetic theory. • Relationship between rate of diffusion and density or relative molecular mass of a gas (illustrate with ammonia and hydrogen chloride) • Calculations on diffusion 	<p>13.0.0 THE MOLE: FORMULAE AND CHEMICAL EQUATIONS (40 Lessons)</p> <p>13.1.0 Specific Objectives By the end of this topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) define the mole b) relate the mole to the relative atomic mass c) convert mass into moles and vice versa d) determine the empirical and molecular formulae of compounds from experimental results and given data e) explain the terms concentration, molarity and dilution of a solution f) define and prepare molar solution g) prepare molar solutions h) carry out titrations and calculations involving molar solutions i) write correct full formulae and ionic equations of reactions with state symbols j) define molar gas volume and atomicity of gases k) state Avogadro's and Gay-Lussac's laws and carry out related calculations. <p>Note: Use of SI units should be emphasised</p> <p>13.2.0 Content</p> <p>13.2.1 The mole as a basic unit</p> <ul style="list-style-type: none"> • The mole as a basic unit. • Molar mass • Relative atomic mass (reference to carbon - 12) the mole as a number of particles (illustrated using 'counting by weighing' experiments) • Conversion of mass in grams to moles and vice versa (consider atoms, molecules and compounds) 	<p>14.0.0 ORGANIC CHEMISTRY I (HYDROCARBONS) (25 Lessons)</p> <p>14.1.0 Specific Objectives By the end of this topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) define a hydrocarbon b) name and draw the structures of simple hydrocarbons (alkanes, alkenes and alkynes). c) state the features of a homologous series d) draw and name isomers of simple hydrocarbons containing not more than five carbon atoms e) describe the general methods of preparing alkanes, alkenes and alkynes f) explain the physical and chemical properties of alkanes, alkenes and alkynes g) state the uses of alkanes, alkenes and alkynes. <p>14.2.0 Content</p> <p>14.2.1 Alkanes</p> <ul style="list-style-type: none"> • General formula: occurrence, nomenclature (consider straight chain alkanes of up to ten carbon atoms); fractional distillation of crude oil. • Isomerism (butane and pentane) • Preparation of methane and ethane • Trends in physical properties (melting point, boiling point, density and solubility in water and in organic solvents) • Chemical properties: burning and substitution reactions with chlorine or bromine <p>13.3.0 Project Carrying out Counting by weighing experiments</p>	<p>14.0.0 ORGANIC CHEMISTRY I (HYDROCARBONS) (25 Lessons)</p> <p>14.1.0 Specific Objectives By the end of this topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) define a hydrocarbon b) name and draw the structures of simple hydrocarbons (alkanes, alkenes and alkynes). c) state the features of a homologous series d) draw and name isomers of simple hydrocarbons containing not more than five carbon atoms e) describe the general methods of preparing alkanes, alkenes and alkynes f) explain the physical and chemical properties of alkanes, alkenes and alkynes g) state the uses of alkanes, alkenes and alkynes. <p>14.2.0 Content</p> <p>14.2.1 Alkanes</p> <ul style="list-style-type: none"> • General formula: occurrence, nomenclature (consider straight chain alkanes of up to ten carbon atoms); fractional distillation of crude oil. • Isomerism (butane and pentane) • Preparation of methane and ethane • Trends in physical properties (melting point, boiling point, density and solubility in water and in organic solvents) • Chemical properties: burning and substitution reactions with chlorine or bromine <p>13.3.0 Project Carrying out Counting by weighing experiments</p>
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(details of reaction mechanism not required)

- Uses of alkanes

14.2.2 Alkenes

- General formula, nomenclature (consider straight chain alkenes of up to six carbon atoms)
- Isomerism (butene and pentene)
- Preparation of ethene; trends in physical properties (melting point, boiling point, solubility in water and non-polar solvent)
- chemical properties (combustion, addition of chlorine, bromine, hydrogen, hydrogen halides, and ethene).
- (details of mechanism not required)
- Test for unsaturation (use acidified potassium manganate (VII) or bromine water)
- Uses of alkenes

14.2.3 Alkynes

- General formula, nomenclature (consider straight chain alkynes of up to six carbon atoms)
- Isomerism (butyne)
- Preparation of ethyne; trends in physical properties (melting point, boiling point, density solubility in water and non-polar solvents)
- chemical properties (combustion and addition reactions with chlorine, hydrogen, bromine, hydrogen halides).
- Uses of alkynes

15.0.0 NITROGEN AND ITS COMPOUNDS (30 lessons)

15.1.0 Specific Objectives

By the end of this topic, the learner should be able to:

- describe the isolation of nitrogen from air
- describe the laboratory preparation, and state the properties and uses of the oxides of nitrogen
- describe the laboratory preparation of nitrogen and state its properties and uses
- describe the laboratory preparation, and state the properties and uses of the oxides of nitrogen
- describe the laboratory preparation of ammonia and state its properties and uses
- explain the difference in chemical reactions of ammonia gas and its aqueous solution
- describe the industrial manufacture of ammonia
- calculate the percentage of nitrogen in nitrogen containing fertilizers
- describe the preparation and manufacture of nitric acid
- describe and explain the reactions of both dilute and concentrated nitric acid
- state the uses of nitric acid
- identify the products formed when different nitrates are heated
- explain the pollution effects of nitrogen compounds in the environment.

15.2.6 Action of heat on nitrates

- Effects of heat on nitrates of sodium, potassium, copper, lead and silver (silver nitrate may be considered theoretically due to its cost)
- Test for nitrates
- Pollution effects of nitrogen compounds in the environment

15.2.3 Oxides of nitrogen (nitrogen (I) oxide, nitrogen(II) oxide, nitrogen(IV) oxide)

15.2.4 Ammonia

- Laboratory preparation and properties of ammonia gas (relate method of collection to the properties of the gas):
 - Solubility in water
 - reaction of aqueous ammonia (NH_3OH) with cations.
 - reaction with air/oxygen (catalysed and uncatalysed), copper(II) oxide and hydrogen chloride,
 - manufacture of ammonia by Haber process. (state optimum conditions only)
 - uses of ammonia
 - Fertilizers; mention of various nitrogen containing fertilizers, (sulphates, nitrates and phosphate), amount of nitrogen in various fertilizers.
- carry out tests to distinguish between sulphite and sulphate ions
- explain the preparation and manufacture of sulphuric acid and state its uses
- distinguish between the reactions of dilute and concentrated sulphuric acid containing compounds.
- describe the preparation and state properties of hydrogen sulphide
- explain environmental pollution caused by sulphur containing compounds.

15.2.5 Nitric acid

- Laboratory preparation and manufacture of nitric acid
- Reaction of dilute nitric acid with: metals, carbonates, hydroxides and oxides
- Reaction of concentrated nitric acid as an oxidizing agent; iron(II) solution, Sulphur and copper metal

15.2.6 Action of heat on nitrates

- Effects of heat on nitrates of sodium, potassium, copper, lead and silver (silver nitrate may be considered theoretically due to its cost)
- Test for nitrates
- Pollution effects of nitrogen compounds in the environment

15.2.7 Pollution effects of nitrogen compounds in the environment

- Laboratory preparations
- Properties and uses of the oxides.
- Solubility in water
 - reaction of aqueous ammonia (NH_3OH) with cations.
 - reaction with air/oxygen (catalysed and uncatalysed), copper(II) oxide and hydrogen chloride,
- describe the preparation and manufacture of ammonia by Haber process. (state optimum conditions only)
- uses of ammonia
- Fertilizers; mention of various nitrogen containing fertilizers, (sulphates, nitrates and phosphate), amount of nitrogen in various fertilizers.
- carry out tests to distinguish between sulphite and sulphate ions
- explain the preparation and manufacture of sulphuric acid and state its uses
- distinguish between the reactions of dilute and concentrated sulphuric acid containing compounds.
- describe the preparation and state properties of hydrogen sulphide
- explain environmental pollution caused by sulphur containing compounds.

15.2.2 Laboratory preparation of nitrogen gas

- Isolation of nitrogen gas from air, laboratory and in industry.

15.2.1 Isolation of nitrogen gas from air

- Isolation of nitrogen gas from air, laboratory and in industry.

16.2.0	Content	17.2.0	Content	
16.2.1	Occurrence and extraction of Sulphur			
• Extraction by Frasch process	16.2.5	Hydrogen sulphide	17.2.1	Chlorine
• Allotropes of sulphur		Preparation and physical properties	Preparation of chlorine by reaction of concentrated hydrochloric acid with manganese(IV) oxide or any other suitable oxidizing agent (reduce method of collection to its properties)	
Physical and chemical properties of sulphur		Chemical properties	Physical properties	
• Uses of sulphur		(reducing action)	Chemical properties	
Sulphur(IV) oxide (sulphur dioxide)			Reactions of chlorine with:	
Preparation (relate method of collection to properties of the gas)	16.2.6	Pollution of atmosphere by compounds of sulphur (hydrogen sulphide and oxides of sulphur)	- hydrogen	
Properties (acid character, bleaching action, reducing action e.g. test with potassium chromate(V) and combination with oxygen to form sulphur(VI) oxide (Sulphur trioxide), oxidizing action e.g. with magnesium and hydrogen sulphide			- metals (magnesium and iron)	
• Test for sulphate and sulphite ions	17.0.0	CHLORINE AND ITS COMPOUNDS (20 Lessons)	- non-metals phosphorous (caution!)	
• Uses of sulphur(IV) oxide	17.1.0	Specific Objectives	- Reducing agents	
		By the end of this topic, the learner should be able to:	(hydrogen sulphide, sulphites and ammonia)	
		a) describe and explain the laboratory preparation of chlorine	- Water and alkali solutions (both dilute and concentrated)	
		b) state and explain the properties and uses of chlorine	- Bromides and iodides (displacement reactions)	
		c) describe and explain the preparation of hydrogen chloride gas	- Bleaching action	
		d) state and explain the properties and uses of hydrogen chloride gas	- Test for chlorides in dry solids and aqueous solution	
		e) explain the effect of a solvent on the properties of hydrogen chloride	Uses of chlorine	
16.2.3	Manufacture of Sulphuric acid	17.2.2	Hydrogen Chloride	
• Contact process (state optimum conditions only)		Preparation of hydrogen chloride gas by reaction of sodium chloride with concentrated sulphuric acid (rate method of collection to properties of the gas)	Preparation of hydrogen chloride	
e.g. Kel Chemical Ltd in Thika, and East Africa Heavy Chemicals, Webuye		Properties (physical and chemical)	• Reactions of aqueous hydrogen chloride	
• Pollution control in contact process			• Compare the properties of aqueous hydrogen chloride and a solution of hydrogen chloride in methylbenzene	
16.2.4	Properties of Sulphuric acid	17.2.3	Effect of solvent on the properties of hydrogen chloride	
• Reaction of concentrated sulphuric acid as:		Reactions of aqueous hydrogen chloride	• Reactions of aqueous hydrogen chloride	
- dehydrating agent (sucrose, ethanol, hydrated copper(II) sulphate)		Compare the properties of aqueous hydrogen chloride and a solution of hydrogen chloride in methylbenzene		
- oxidizing agent (copper, zinc, sulphur and carbon)				
- displacement reaction (sodium chloride solid, potassium nitrate solid)				
Reactions of dilute sulphuric acid with:				
- metals				

FORM FOUR

18.0.0 ACIDS, BASES AND SALTS (25 Lessons)

18.1.0 Specific Objectives

By the end of this topic, the learner should be able to:

- a) define acids, bases and salts
- b) explain the differences between aqueous solutions of weak and strong acids; weak and strong bases; based on the degree to which they dissociate into ions
- c) write formulae and ionic equations for specified acid-base and precipitation reactions
- d) explain the effect of solvent in acid-base character
- e) test for the presence of specified cations and anions
- f) identify the precipitates and complex ions produced by specified cation-anion reactions
- g) explain the use of solubility curves in salt extraction
- h) state the types and causes of hardness of water
- i) state the effects and explain the methods of removal of water hardness.

18.2.2 Characteristics of Amphoteric oxides and hydroxides

- Reaction with acids and alkalis (aluminium oxide, zinc(II) oxide, zinc hydroxide lead hydroxide, and aluminium hydroxide).

18.2.3 Effect of solvent.

- Characteristics of hydrogen chloride in methyl benzene and aqueous solution, (illustrate with dry litmus, magnesium and marble chips)
- Reactions of dry and aqueous ammonia

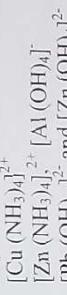
18.2.4 Salts

- Salts as ionic compounds formed when cations derived from bases combine with anions derived from acids Precipitation reactions (use ionic equations)
- Reactions involving the following cations in aqueous solutions: magnesium, calcium, iron(II), iron(III), Barium(II), Zinc(II), Aluminium(III), Copper(II) with; sodium hydroxide, ammonia solution, Chloride, Carbonate, sulphite and sulphate ions

18.2.0 Content 18.2.1 Acids and Bases

- Acids as substances which dissociate in water to give hydrogen ions
- Bases as substances which dissociate in water to give hydroxide ions
- Weak and strong acids and bases; pH scale and electrical conductivity, (use aqueous solutions of, hydrochloric acid, ethanoic acid, sodium hydroxide and ammonia of

Formulae of the following required,



Equations not required

- Solubility; definition and relationship with temperature
- Solubility curves for sodium chloride, potassium nitrate, potassium chlorate(V), calcium sulphate and sodium carbonate.
- Fractional crystallization of salts
- Extraction of sodium carbonate from Lake Magadi and sodium chloride at Ngomeni

18.2.6 Water hardness

- Types of water hardness: causes and effects
- Methods of removal of water hardness; boiling, distillation, precipitation and use of ion exchange

18.3.0 Projects

- a) Salt extraction from ash or soil.
- b) Investigation of water hardness and its removal

19.0.0 ENERGY CHANGES IN CHEMICAL AND PHYSICAL PROCESSES (25 Lessons)

19.1.0 Specific Objectives

- By the end of this topic, the learner should be able to:
- a) define exothermic and endothermic reactions using ΔH notation
 - b) draw energy level diagrams
 - c) explain fusion and vaporisation as evidence of inter-particle forces
 - d) explain that energy changes in chemical reactions are due to

bond formation and bond breaking

- e) define and explain various types of heat changes
- f) carry out experiments to determine enthalpy changes for some reactions
- g) write correct simple thermochemical equations
- h) state Hess' Law and carry out related calculations
- i) state and explain the factors that influence the choice of fuel
- j) explain the environmental effects of fuels.

- Enthalpy notation (ΔH) for exothermic reactions and endothermic reactions
- Latent heat
 - Molar heat of fusion and vapourisation as evidence of overcoming forces of attraction between particles.
- Quantitative determination of enthalpies
 - Formation of hydrogen chloride gas from hydrogen gas and chlorine gas; formation of chloromethane from methane and chlorine gas
- Quantitative determination of enthalpies of:
 - Solution (e.g. ammonium nitrate, sodium hydroxide and conc. sulphuric acid)
 - Combustion (e.g. methanol/ethanol)
 - Displacement (e.g. copper from copper (II) ions by iron or zinc)
 - Neutralization (e.g. sodium hydroxide and dilute hydrochloric acid).

the same concentration to illustrate)

18.2.0 Content 18.2.1 Acids and Bases

18.2.2 Characteristics of Amphoteric oxides and hydroxides

- Reaction with acids and alkalis (aluminium oxide, zinc(II) oxide, zinc hydroxide lead hydroxide, and aluminium hydroxide).

18.2.3 Effect of solvent.

- Characteristics of hydrogen chloride in methyl benzene and aqueous solution, (illustrate with dry litmus, magnesium and marble chips)
- Reactions of dry and aqueous ammonia

18.2.4 Salts

- Salts as ionic compounds formed when cations derived from bases combine with anions derived from acids Precipitation reactions (use ionic equations)
- Reactions involving the following cations in aqueous solutions: magnesium, calcium, iron(II), iron(III), Barium(II), Zinc(II), Aluminium(III), Copper(II) with; sodium hydroxide, ammonia solution, Chloride, Carbonate, sulphite and sulphate ions

19.0.0 ENERGY CHANGES IN CHEMICAL AND PHYSICAL PROCESSES (25 Lessons)

19.1.0 Specific Objectives

- By the end of this topic, the learner should be able to:
- a) define exothermic and endothermic reactions using ΔH notation
 - b) draw energy level diagrams
 - c) explain fusion and vaporisation as evidence of inter-particle forces
 - d) explain that energy changes in chemical reactions are due to

19.2.4 Simple energy level diagrams

- Hess' Law (energy level diagrams and thermo chemical cycles) (use molar enthalpy of formation for illustration)
- Relate heat of solution to hydration and lattice energy

- g) explain chemical equilibrium as a state of 'balance'
- h) explain the effect of different factors on the position of equilibrium.

19.2.5 Common fuels; Energy contents of:

- Charcoal, fuel oil, ethanol (methylated spirit), liquid petroleum gas (LPG), petroleum, kerosene and diesel
- Choice of fuel;
- Precautions necessary when using fuels

- The effect of changing concentration, pressure and temperature on position of equilibrium. Le Chatelier's Principle
- Uses in industrial processes (Contact and Haber processes).

19.2.6 Pollution by common fuels e.g. internal combustion engine

- Experiments involving the following reactions:
 - calcium carbonate (marble chips) with dilute acid (hydrochloric or nitric acid).
 - sodium thiosulphate with dilute hydrochloric acid
 - metal with dilute acid (e.g. magnesium with hydrochloric acid).
 - hydrogen peroxide with various catalysts e.g. manganese (IV) oxide (Graphical representation of results required)

- Definition of rate of reaction
- Collision theory and activation energy (qualitative treatment only)
- Qualitative treatment of the effects of concentration, pressure, temperature, surface area, light and catalysts on rates of reactions. (No reaction mechanisms required).

**20.2.0 Content
Reaction rates**

- Specific objectives
- By the end of this topic, the learner should be able to:
 - a) explain redox reactions in terms of gain and loss of electrons
 - b) identify changes in oxidation numbers during redox reactions
 - c) write balanced redox equations
 - d) explain an electrochemical cell in terms of electron transfer process
 - e) draw cell diagrams and write the cell notations
 - f) explain the construction and working of an electrochemical cell such as zinc - copper cell compare oxidizing and reducing power of ions from displacement reactions

**20.2.1 Content
(25 Lessons)**

- Displacement reactions;
- Reducing power
- Reaction of metal/metal - cation (M/M^{2+} (aq)).
- Calcium, magnesium, zinc, iron, lead, copper.
- Oxidizing power of halogens: chlorine, bromine and iodine only.

- Definition of rate of reaction
- Le Chatelier's Principle
- Uses in industrial processes (Contact and Haber processes).

- Use an illustration of iron(II) (acidified with dilute sulphuric acid) to iron(III) with hydrogen peroxide.
- Identify reactant - Iron(II) (aq), and product Iron(III) (aq), with hydroxide ion. Other examples; sodium/water magnesium/dilute acid (hydrochloric acid/sulphuric acid)

21.2.0 Content

- Redox reactions
- Electron transfer (gain and loss of electrons)
- Determination of oxidation numbers
- Use an illustration of iron(II) (acidified with dilute sulphuric acid) to iron(III) with hydrogen peroxide.
- Identify reactant - Iron(II) (aq), and product Iron(III) (aq), with hydroxide ion. Other examples; sodium/water magnesium/dilute acid (hydrochloric acid/sulphuric acid)

21.2.1 Redox reactions

- Redox reactions
- Reducing power
- Reaction of metal/metal - cation (M/M^{2+} (aq)).
- Calcium, magnesium, zinc, iron, lead, copper.
- Oxidizing power of halogens: chlorine, bromine and iodine only.

- Definition of rate of reaction
- Le Chatelier's Principle
- Uses in industrial processes (Contact and Haber processes).

**21.2.2 Displacement reactions;
(as redox reactions)**

- Redox reactions
- Reducing power
- Reaction of metal/metal - cation (M/M^{2+} (aq)).
- Calcium, magnesium, zinc, iron, lead, copper.
- Oxidizing power of halogens: chlorine, bromine and iodine only.

- Definition of rate of reaction
- Le Chatelier's Principle
- Uses in industrial processes (Contact and Haber processes).

21.2.3 Electrochemical cell

- Qualitative treatment of the electron flow in:
 $Zn(s) | Zn^{2+}(aq) || Cu^{2+}(aq) | Cu(s)$
- Note: Conventions, vertical line (|) represents a phase boundary where a potential difference develops e.g. $Zn(s) | Zn^{2+}(aq);$ two vertical parallel lines (||) represent a salt bridge.
- Standard electrode potentials (simple calculations involving E^θ values required)

20.2.2 Reversible reactions

- Equilibrium as the state of balance (example acid/alkali plus indicator, chromate/dichromate, hydrated and anhydrous copper(II) sulphate)

- Definition of rate of reaction
- Le Chatelier's Principle
- Uses in industrial processes (Contact and Haber processes).

21.2.4 Content

- Equilibrium as the state of balance (example acid/alkali plus indicator, chromate/dichromate, hydrated and anhydrous copper(II) sulphate)

- 21.2.4 Electrolysis**
- The role of water in electrolysis.
 - Preferential discharge in electrolysis of the following solutions:
 - Sodium chloride
 - Dilute sulphuric acid (acidified water).
 - Magnesium sulphate
 - Electrolysis of copper (II) sulphate using graphite and copper electrodes. (product changes in electrolytes)
 - Factors affecting preferential discharge
 - Quantitative treatment of electrolysis (Note: First Faraday's law only).
- 21.2.5 Applications**
- Extraction of metals
 - Manufacture of sodium hydroxide, chlorine, hydrogen (electrolysis of brine).
 - Copper refining, electroplating
- 21.3.0 Projects**
- Investigating further electroplating processes, prevention of rusting (cathodic protection), investigate various types of cells.
- 22.0.0 METALS (20 Lessons)**
- 22.1.0 Specific objectives**
- By the end of this topic, the learner should be able to:
- name the chief ores of some metals
 - describe and explain general methods used in the extraction of metals from their ores
- 22.2.0 Content**
- 22.2.1 Properties of Metals**
- Chief metal ores of: sodium, aluminium, zinc, iron, copper and lead
 - General methods of extraction (electrolysis and reduction)
 - The electrolytic production of sodium and aluminium
 - Extraction of iron, copper, and zinc from their ores.
- 22.2.2 Properties of Metals** (sodium, aluminium, iron, copper and zinc):
 - Physical properties (melting point, boiling point, thermal and electrical conductivity, density, malleability and ductility)
 - Chemical properties (reaction with air, water, chlorine, dilute hydrochloric acid and oxidizing acids (concentrated nitric and sulphuric acid))
- (Note: the reaction of sodium and dilute acid is explosive)
- 22.2.3 Uses of metals and their alloys**
- (alloys: brass, bronze, steel, duralumin) - construction (air craft, bridges etc.), electrical materials (copper)
- Pollution effect of the industrial production of metals on the environment

22.3.0 Projects	<ul style="list-style-type: none"> Analysis of ores Construction of a mini-blast furnace Carrying out iron - smithing
23.0.0 ORGANIC CHEMISTRY II (ALKANOLS AND ALKANOIC ACIDS) (20 Lessons)	<ul style="list-style-type: none"> Physical properties: Gradual changes in physical properties of primary alkanols (mention hydrogen bonding) Chemical properties: Reactions with oxygen (burning), sodium, concentrated sulphuric acid (to give alkenes), ester formation and oxidation to give alkanoic acids Uses - solvents, fuels and pharmaceuticals.
23.1.0 Specific Objectives	<p>By the end of this topic, the learner should be able to:</p> <ol style="list-style-type: none"> name and draw the structures of simple alkanols and alkanoic acids describe the preparation and explain the physical and chemical properties of alkanols and alkanoic acids state the main features of the homologous series state and explain the uses of some alkanols and alkanoic acids describe the preparation, properties and uses of detergents explain the effect of hard water on detergents list some natural, synthetic polymers, fibres and state their uses describe the preparation, properties and uses of some synthetic polymers identify the structure of a polymer given the monomer state the advantages and disadvantages of synthetic materials compared to those of natural origin in terms of both structure and properties.
23.2.0 Content	<p>23.2.1 Alkanols</p> <ul style="list-style-type: none"> General formula - RCOOH Nomenclature (primary alkanoic acids up to 10 carbon atoms) Preparation by oxidation of primary alkanols (mention hydrogen bonding) Physical properties - gradual change in physical properties of alkanoic acids formation [up to 2 carbons only] <p>Note: equations involving these reactions are required (state symbols are not required)</p>
23.2.3 Detergents	<ul style="list-style-type: none"> Soapy detergents (soaps) <ul style="list-style-type: none"> - laboratory preparation by hydrolysis of fats or oils with alkalis - mode of action - water hardness

- pollution effects
 - Soapless detergents
 - manufacture
 - mode of action
 - pollution effect
 - Polymers
 - Names of some natural polymers and fibres
 - cellulose materials (cotton, wood, paper; silk)
 - hydrocarbons (rubber and its vulcanisation)
 - Names of some synthetic polymers and fibres
 - Polythene, polychloroethene (pvc)
 - polyphenylethene (polystyrene)
 - terylene, nylon, and Perspex.
 - Synthetic rubber
 - Preparation properties and uses of synthetic polymers
 - Equations to show addition polymerisation for example formation of polythene, polychloroethene and polyphenylethene
 - Advantages and disadvantages of synthetic polymers and fibres over those of natural origin should be mentioned. (include biological degradability of the materials).
 - Uses of polymers and fibres, manufacture of beer, spirits, soaps and detergents, drugs, textiles, packaging materials, pipes and tyres.
- NB:** Nuclear reactions are different from chemical reactions.
- 24.0.0 RADIOACTIVITY (10 Lessons)**
- 24.1.0 Specific Objectives**
- By the end of this topic, the learner should be able to:
- define radioactivity, half-life, radioisotope and nuclides
 - state types of radioactivity
 - name the particles emitted during radioactive decay and state their properties
 - carry out simple calculations involving half-life ($t_{1/2}$)
 - write balanced nuclear equations
 - distinguish between nuclear fission and fusion
 - state uses of some radioisotopes
 - state dangers associated with radioactivity.
- SUGGESTED ASSESSMENT METHODS**
- Oral Questions
 - Observation of individual/group activities
 - Short answer questions
 - Practical test/assignments
 - Written assignments
 - Project work
 - Field trips
- 24.2.0 Content**
- 24.2.1 Stability of isotopes of elements**
- Stability of isotopes of elements
 - Radioactivity, types of radiation, (alpha (α), beta (β)) particles and gamma (γ) rays; characteristics and properties
 - Radioactive decay as measured by half-life ($t_{1/2}$), calculations involving half-life ($t_{1/2}$)
 - Nuclear equations; changes in nuclei resulting from radioactive decay by alpha (α), beta (β) particles and gamma (γ) rays
 - Qualitative treatment of fission and fusion
- 24.2.2 Applications**
- Uses and importance of radioisotopes in chemistry, medicine, carbon dating and agriculture.
- 24.2.3 Pollution effects of radioactivity**
- Dangers of radio isotopes Environmental pollution e.g. the Chernobyl disaster, titanium mining in Kware

BIOLOGY

INTRODUCTION

GENERAL OBJECTIVES

The study of Biology aims at equipping the learner with the knowledge, attitudes and skills necessary for controlling and preserving the environment. The subject enables the learner to appreciate humans as part of the broader community of living organisms. This subject is important in fields such as health, agriculture, environment and education. Biology is the precursor of biotechnology which is a tool for industrial and technological development

The content has been carefully reorganized to ensure that the required concepts and skills are realized. Sufficient practical activities have been suggested. These should be taught alongside the respective content rather than being treated as a separate entity. It is recommended that the teachers use discovery method in achieving the objectives of this subject. Most of the apparatus, chemicals and equipment required for practical activities are affordable. However, the teacher is highly encouraged to improvise using locally available materials to reduce costs.

Contemporary issues such as HIV/AIDS, S.T.I.s, drug abuse and environmental pollution which have an impact on the learner's life have been incorporated for study.

The current system of using five kingdoms in classification has been adapted instead of the traditional two kingdom system

It is envisaged that this syllabus should be adequately covered within the allocated time. A suggested guideline on time allocation per topic has been provided to help the teacher in lesson planning. This however, can be adjusted to meet the requirements of the individual class.

By the end of the course, the learner should be able to:

1. communicate biological information in a precise, clear and logical manner
2. develop an understanding of interrelationships between plants and animals and between humans and their environment
3. apply the knowledge gained to improve and maintain the health of the individual, family and the community
4. relate and apply relevant biological knowledge and understanding to social and economic situations in rural and urban settings
5. observe and identify features of familiar and unfamiliar organisms, record the observation and make deductions about the functions of parts of organisms
6. develop positive attitudes and interest towards biology and the relevant practical skills
7. demonstrate resourcefulness, relevant technical skills and scientific thinking necessary for economic development
8. design and carry out experiments and projects that will enable them understand biological concepts
9. create awareness of the value of cooperation in solving problems
10. acquire a firm foundation of relevant knowledge, skills and attitudes for further education and for training in related scientific fields.

		3.3.4 Comparison between plant and animal cells
		3.3.5 Observe, estimate size and calculate magnification of plant cells
		4.0.0 CELL PHYSIOLOGY (20 lessons)
		Specific Objectives
		By the end of the topic, the learner should be able to:
		a) define biology
		b) list branches of biology
		c) explain the importance of biology
		d) state the characteristics of living organisms
		e) state the main differences between plants and animals.
		Content
		2.2.0 Review the use of magnifying lens
		2.2.1 External features of plants and animals
		2.2.3 Necessity and significance of classification
		2.2.4 Major units of classification: (naming)
		• Kingdoms <ul style="list-style-type: none"> - Monera - protocista - fungi - plantae - animalia (At least one example of each)
		• For kingdom plantae and animalia, cover <ul style="list-style-type: none"> phylum/division, class, order, family, genus and species. Show relationship between the taxonomic units (Give at least one example of each taxon)
		Practical Activities
		Collecting, observing and recording external features of plants and animals
		3.0.0 CLASSIFICATION 1 (12 lessons)
		Specific Objectives
		By the end of the topic, the learner should be able to:
		a) use the magnifying lens to observe the external features of plants and animals
		b) record observations of the main external characteristics of living organisms, preserved specimens and photographs
		c) state the necessity and significance of classification
		d) name the major units of classification
		Content
		3.3.0 Binomial nomenclature in naming organisms.
		3.3.1 Content
		Meaning of cell physiology
		Structure and properties of cell membrane (Theories of membrane structure not required)
		Physiological processes - diffusion, osmosis and active transport
		Factors affecting diffusion, osmosis and active transport
		Role of diffusion, osmosis and active transport in living organisms
		Water relations in plant and animal cells; turgor, plasmolysis, wilting and haemolysis
		3.1.0 Specific Objectives
		By the end of the topic, the learner
		should be able to:
		a) use the magnifying lens to observe the external features of plants and animals
		b) record observations of the main external characteristics of living organisms, preserved specimens and photographs
		c) state the necessity and significance of classification
		d) name the major units of classification
		3.2.0 Content
		3.2.1 Definition of the cell
		3.2.2 Structure and functions of parts of a light microscope
		3.2.3 Use and care of the light microscope
		3.2.4 Cell structure and functions as seen under <ul style="list-style-type: none"> • a light microscope • an electron microscope
		3.2.5 Preparation of temporary slides of plant cells
		3.2.6 Estimation of cell size
		3.2.7 Cell specialization, tissues, organs and organ systems
		3.3.0 Practical activities
		3.3.1 Observe, identify, draw and state the functions of parts of the light microscope
		3.3.2 Prepare and observe temporary slides of plant cells
		3.3.3 Observe permanent slides of animal cells

	4.3.0 Practical Activities		Meaning and types of heterotrophism
4.3.1	Diffusion as demonstrated with potassium permanganate or potassium iodide/flower dyes/coloured plant extracts/smoke	k) relate the structures of the mammalian (human) alimentary canal to their functions	<ul style="list-style-type: none"> • Modes of feeding in animals • Dentition of a named carnivorous, herbivorous and omnivorous mammal • Adaptation of the three types of dentition to feeding • Internal structure of mammalian teeth
4.3.2	Experiments with visking tubing and living tissues: fresh arrow roots/cassava/sweet potatoes/leaf petioles/irish potatoes/carrots	l) explain the role of enzymes in digestion in a mammal (human)	<ul style="list-style-type: none"> • Common dental diseases, their causes and treatment
4.3.3	Plasmolysis can be demonstrated by using any of the following: spirogyra, epidermal cells of onion or raw egg that has been put in dilute hydrochloric acid overnight	m) explain the factors that determine energy requirements in humans.	<ul style="list-style-type: none"> • Digestive system and digestion in a mammal (human) • Digestive system, regions, glands and organs associated with digestion • Ingestion, digestion, absorption, assimilation and egestion
5.0.0 NUTRITION IN PLANTS AND ANIMALS (59 lessons)	5.2.0 Content	5.2.1 Meaning, importance and types of nutrition	5.2.5 Importance of vitamins, mineral salts, roughage and water in human nutrition
5.1.0 Specific Objectives	5.2.2 Nutrition in plants (autotrophism)	<ul style="list-style-type: none"> • Definition of photosynthesis and its importance in nature • Adaptations of leaf to photosynthesis • Structure and function of chloroplast • Process of photosynthesis - light and dark stages (omit details of electron transport system and chemical details of carbon dioxide fixation) • Factors influencing photosynthesis <ul style="list-style-type: none"> - light intensity - carbon dioxide concentration - water - temperature 	5.2.6 Importance of vitamins, mineral salts, roughage and water in human nutrition
	By the end of the topic, the learner should be able to:		5.2.7 Factors determining energy requirements in humans
	a) define nutrition and state its importance in living organisms	a) define nutrition and state its importance in living organisms	5.3.0 Practical activities
	b) differentiate various modes of feeding	b) differentiate various modes of feeding	5.3.1 Carry out experiments on factors affecting photosynthesis
	c) describe photosynthesis and show its importance in nature	c) describe photosynthesis and show its importance in nature	5.3.2 Observe stomata distribution
	d) explain how the leaf is adapted to photosynthesis	d) explain how the leaf is adapted to photosynthesis	5.3.3 Carry out food test experiments
	e) explain the factors affecting photosynthesis	e) explain the factors affecting photosynthesis	5.3.4 Carry out experiments on factors affecting enzymatic activities
	f) distinguish between carbohydrates, proteins and lipids	f) distinguish between carbohydrates, proteins and lipids	5.3.5 Investigate presence of enzymes in living tissues (plants and animals)
	g) state the importance of various chemical compounds in plants and animals	g) state the importance of various chemical compounds in plants and animals	5.3.6 Observe, identify, draw and label different types of mammalian teeth
	h) explain the properties and functions of enzymes	h) explain the properties and functions of enzymes	5.3.7 Carry out dissection of a small mammal to observe digestive system and associated organs (demonstration)
	i) relate various types of teeth in mammals to their feeding habits	i) relate various types of teeth in mammals to their feeding habits	
	j) differentiate between omnivorous, carnivorous and herbivorous modes of feeding	j) differentiate between omnivorous, carnivorous and herbivorous modes of feeding	5.2.4 Nutrition in Animals (heterotrophism)

FORM TWO

<p>6.0.0 TRANSPORT IN PLANTS AND ANIMALS (52 lessons)</p> <p>6.1.0 Specific Objectives By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) define transport and explain the necessity of transport in plants and animals b) relate the structure of the root, root hair, xylem and phloem to their functions c) relate the internal structure of the leaf to transpiration d) explain possible forces involved in the movement of water and mineral salts through the plant e) explain the significance of and factors affecting transpiration f) demonstrate simple experiments on transpiration g) distinguish between closed and open circulatory systems h) relate the structure of the heart and the blood vessels to their functions i) trace the path taken by blood from the heart to all parts of the body, and back to the heart j) name the common diseases of the circulatory system in humans and suggest methods of control / prevention k) relate the structure of the components of blood to their functions l) explain how oxygen and carbon dioxide are transported in the blood m) describe the mechanism of blood clotting and its importance n) describe the human blood groups and their importance in blood transfusion 	<p>o) explain immunity and describe immune responses.</p> <p>6.2.0 Content Meaning and importance of transport systems Absorption of Water and Mineral Salts Internal structure of root and root hairs • Absorption of water • Active uptake of mineral salts</p> <p>6.2.1 Meaning and importance of transport systems</p> <p>6.2.2 Internal structure of root and root hairs</p> <p>6.2.3 Transpiration • Definition of transpiration • Review of the structure of the leaf</p> <p>6.2.4 Translocation • Structure and function of xylem • Factors affecting transpiration • Forces involved in water movement in plants <ul style="list-style-type: none"> - Transpiration pull - Cohesion and adhesion - Capillarity - Root pressure </p> <p>6.2.5 Comparison between open and closed circulatory system</p> <p>6.2.6 Mammalian Circulatory System Structure and function of the heart, arteries, veins, and capillaries • Diseases and defects of the circulatory system (Thrombosis, Varicose veins, Arterio-sclerosis) and how to control them.</p>	<p>6.2.7 The Structure and Functions of Blood <ul style="list-style-type: none"> • Composition of blood • Functions of blood plasma • The structure and functions of red blood cells and white blood cells • Mechanism of blood clotting and its importance • Blood groups (ABO system and the Rhesus factor) • Immune responses • Natural and artificial immunity • Allergic reactions • Importance of vaccinations against diseases (Tuberculosis, Poliomyelitis, Measles, Diphtheria, Whooping cough) </p> <p>6.2.8 Internal structures of aquatic and terrestrial roots, stems and leaves</p> <p>6.2.9 Respiratory structures in animals and relate them to their functions <ul style="list-style-type: none"> • state the characteristics of respiratory surfaces • describe the mechanisms of gaseous exchange in protozoa, insects, fish, frog and mammal • describe the factors which control the rate of breathing in humans • state the causes, symptoms and prevention of respiratory diseases. </p> <p>6.3.0 Practical Activities</p> <p>Observe permanent slides of sections of stems and roots</p> <p>6.3.1 Carry out experiments to compare transpiration on lower and upper leaf surfaces</p> <p>6.3.2 Observe wall charts/models</p> <p>6.3.3 Analyse data on transpiration rate under different environmental conditions in Plants</p> <p>6.3.4 Dissect a small mammal and observe its transport system (demonstration)</p> <p>6.3.5 Make a longitudinal section of the mammalian heart to display the chambers and associated blood vessels</p> <p>6.3.6 Record pulse rate at the wrist before and after vigorous activities and analyse the results</p> <p>6.3.7 Demonstrate the unidirectional flow of blood in the cutaneous veins of the fore arm</p> <p>6.3.8 Gaseous Exchange in Animals <ul style="list-style-type: none"> • Types and Characteristics of Respiratory Surfaces - cell membrane, gills, buccal cavity, skin and lungs • Mechanism of gaseous exchange in Protozoa - amoeba </p>
<p>7.0.0 GASEOUS EXCHANGE (36 lessons)</p>	<p>7.1.0 Specific Objectives By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) explain the need for gaseous exchange in living organisms b) explain the mechanism of gaseous exchange in plants c) compare the internal structures of aquatic and terrestrial roots, stems and leaves d) examine various types of respiratory structures in animals and relate them to their functions e) state the characteristics of respiratory surfaces f) describe the mechanisms of gaseous exchange in protozoa, insects, fish, frog and mammal g) describe the factors which control the rate of breathing in humans h) state the causes, symptoms and prevention of respiratory diseases. <p>7.2.0 Content</p> <p>Gaseous Exchange in living organisms (necessity)</p> <p>7.2.1 Gaseous Exchange in Plants</p> <p>7.2.2 Mechanisms of opening and closing of stomata <ul style="list-style-type: none"> • The process of gaseous exchange in root, stem and leaves of both aquatic (floating) and terrestrial plants </p>	<p>7.0.0 GASEOUS EXCHANGE (36 lessons)</p> <p>7.1.0 Specific Objectives By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) explain the need for gaseous exchange in living organisms b) explain the mechanism of gaseous exchange in plants c) compare the internal structures of aquatic and terrestrial roots, stems and leaves d) examine various types of respiratory structures in animals and relate them to their functions e) state the characteristics of respiratory surfaces f) describe the mechanisms of gaseous exchange in protozoa, insects, fish, frog and mammal g) describe the factors which control the rate of breathing in humans h) state the causes, symptoms and prevention of respiratory diseases. <p>7.2.0 Content</p> <p>Gaseous Exchange in living organisms (necessity)</p> <p>7.2.1 Gaseous Exchange in Plants</p> <p>7.2.2 Mechanisms of opening and closing of stomata <ul style="list-style-type: none"> • The process of gaseous exchange in root, stem and leaves of both aquatic (floating) and terrestrial plants </p>
		<p>7.2.3 Gaseous Exchange in Animals <ul style="list-style-type: none"> • Types and Characteristics of Respiratory Surfaces - cell membrane, gills, buccal cavity, skin and lungs • Mechanism of gaseous exchange in Protozoa - amoeba </p>

	- Insect - grasshopper	8.2.2	Tissue respiration	<ul style="list-style-type: none"> Mitochondrion - structure and function Aerobic respiration (Details of kreb's cycle not required) 	<ul style="list-style-type: none"> Temperature regulation (mention the role of hypothalamus) Common kidney diseases, their symptoms and possible methods of prevention and control.
7.2.4	Factors affecting rate of breathing in humans			<ul style="list-style-type: none"> Anaerobic respiration in plants and animals, the products and by-products Application of anaerobic respiration in industry and at home Compare the energy output of aerobic and anaerobic respiration 	<ul style="list-style-type: none"> The role of the skin in thermoregulation, salt and water balance Major functions of the liver and their contributions to homeostasis Common diseases of the liver, their symptoms and possible methods of prevention/control
7.2.5	Respiratory diseases: Asthma, Bronchitis, Pulmonary tuberculosis, Pneumonia and Whooping cough				
7.3.0	Practical Activities				
7.3.1	Observe permanent slides of cross-sections of aerial and aquatic leaves and stems	8.3.0	Practical Activities	<ul style="list-style-type: none"> Carry out experiments to Investigate <ul style="list-style-type: none"> The gas produced when food is burnt The gas produced during fermentation Heat production by germinating seeds 	<ul style="list-style-type: none"> Practical Activities Examine and draw the mammalian kidney Make vertical sections of the kidney to identify cortex and medulla Observe permanent slides of mammalian skin Investigate effect of catalase enzyme on hydrogen peroxide
7.3.2	Examine the distribution of spiracles on grasshopper or locust	8.3.1			
7.3.3	Examine the gills of a bony fish				
7.3.4	Dissect a small mammal and identify the structures of the respiratory system (demonstration)				
7.3.5	Construct and use models to demonstrate breathing mechanisms in a mammal (human)				
7.3.6	Demonstrate the effect of exercise on the rate of breathing	9.0.0	EXCRETION AND HOMEOSTASIS (42 lessons)		
8.0.0	RESPIRATION (18 lessons)	9.1.0	Specific Objectives	<p>By the end of the topic, the learner should be able to:</p> <ol style="list-style-type: none"> distinguish between excretion and egestion explain the necessity for excretion in plants and animals state the uses of excretory products of plants describe the methods of excretion in a named unicellular organism relate the structures of the human skin, lungs, liver and kidney to their functions name common kidney diseases explain the concept of internal environment and homeostasis 	
8.1.0	Specific Objectives			<p>By the end of the topic, the learner should be able to:</p> <ol style="list-style-type: none"> explain the significance of respiration in living organisms distinguish between aerobic and anaerobic respiration describe the economic importance of anaerobic respiration in industry and at home describe experiments to show that respiration takes place in plants and animals. 	
8.2.0	Content	8.2.1	Meaning and significance of respiration		

11.3.0 Practical activities

- 11.3.1 Collect, record, analyse and interpret data from ecological studies (examples of food chains should be used to join up to make food webs. Calculate ratios of consumers to producers from data provided)
- 11.3.2 Examine specimens of hydrophytes, mesophytes and xerophytes, and identify the features that adapt them to their habitats
- 11.3.3 Examine roots of legumes taken from fertile and poor soils to compare the number of root nodules
- 11.3.4 Estimate populations using sampling methods (for quadrat and line/belt transect, measure pH, temperature, wind direction and humidity)

- Functions of the parts of reproductive system
- Fertilization, implantation and the role of placenta
- Gestation period
- Role of hormones in reproduction in humans (secondary sexual characteristics, menstrual cycle)
- Sexually transmitted infections (S.T.I.s)
- Herpes simplex
- Syphilis, Trichomoniasis, Hepatitis, Candidiasis
- HIV/AIDS (Acquired Immune Deficiency Syndrome) - emphasize preventive measures especially change of behaviour
- Advantages and disadvantages of asexual and sexual reproduction.

- g) differentiate between internal and external fertilization as exhibited by amphibians and mammals (humans)
- h) relate structure of the human reproductive system to its functions
- i) describe the role of hormones in human reproduction
- j) identify the symptoms and disadvantages of sexual and asexual reproduction.

- 12.2.0 **Content**
- 12.2.1 Concept of reproduction
- Importance of reproduction
 - Chromosomes, mitosis and meiosis (mention gamete formation)
- 12.2.3 Asexual reproduction
- Binary fission in amoeba
 - Spore formation/reproduction in mucor/Rhizopus
 - Budding in yeast
- 12.2.4 Sexual reproduction in plants
- Structure and functions of parts of named insect and wind pollinated flowers
 - Pollination and agents of pollination
 - Features and mechanisms that hinder self-pollination and self fertilization
 - The process of fertilization
 - Fruit and seed formation and dispersal
- 12.2.5 Sexual reproduction in animals
- External fertilization in amphibians
 - Structure of the reproductive system of a named mammal (human)

12.0.0 REPRODUCTION IN PLANTS AND ANIMALS (50 lessons)

12.1.0 Specific Objectives

- By the end of the topic, the learner should be able to:
- a) describe location and appearance of chromosomes and chromosome movement during mitosis and meiosis
 - b) differentiate between mitosis and meiosis stating their significance in reproduction
 - c) describe and state the importance of asexual reproduction, binary fission, spore formation and budding compare adaptations of wind and insect pollinated flowers
 - d) describe the process of fertilization in flowering plants
 - e) describe and explain how

13.0.0 GROWTH AND DEVELOPMENT (20 lessons)

13.1.0 Specific Objectives

- By the end of the topic, the learner should be able to:
- a) differentiate growth from development
 - b) analyse experimental data on growth rates
 - c) identify parts of a named seed and factors affecting viability and dormancy in seeds
 - d) investigate conditions necessary for germination and distinguish the types of germination
 - e) measure one aspect of growth in a given seedling
 - f) determine the region of growth in seedlings
 - g) explain apical dominance and distinguish between complete and incomplete metamorphosis in insects
 - h) explain the role of hormones in regulating growth and development.
- 12.2.6 Sexually transmitted infections (S.T.I.s)
- Gonorrhoea
 - Herpes simplex
 - Syphilis, Trichomoniasis, Hepatitis, Candidiasis
 - HIV/AIDS (Acquired Immune Deficiency Syndrome) - emphasize preventive measures especially change of behaviour
- 12.2.7 Advantages and disadvantages of asexual and sexual reproduction.
- 12.3.0 **Practical Activities**
- 12.3.1 Examine stages of mitosis using squashed young onion tip/charts/electron micrographs
- 12.3.2 Examine stages of meiosis using anthers of a flower
- 12.3.3 Grow bread mould and examine using a hand lens
- 12.3.4 Examine spores in sori of a fern
- 12.3.5 Examine various types of insect and wind pollinated flowers and relate structure to function
- 12.3.6 Collect, classify and dissect fruits and seeds and relate their structure to mode of dispersal
- 12.3.7 Dissect a small mammal to show organs associated with reproduction (demonstration)
- 13.2.0 **Content**
- 13.2.1 Concepts of growth and development
- 13.2.2 Growth and development in plants
- Dormancy and ways of breaking it
 - Conditions necessary for germination
 - Epigaeal and hypogaeal germination
 - Measurement of one aspect of growth in a named seedling e.g., region of growth
 - Primary and secondary growth
 - Role of growth hormones in plants
 - Apical dominance
- 13.2.3 Growth and development in

- Complete and incomplete metamorphosis in insects
- Role of growth hormones in insects

13.3.0 Practical activities

- Determine the region of growth in shoots and roots
- Investigate hypogeal and epigeal germination
- Carry out experiments to demonstrate apical dominance
- Observe stages of complete and incomplete metamorphosis in insects

13.4.0 Project work:

Measure either length of internodes/breadth of leaves/height/dry weight of seedlings over a known period of time, analyse and present the data obtained in form of graphs, charts or histograms

FORM FOUR

14.0.0 GENETICS (34 lessons) <ul style="list-style-type: none"> • Complete and incomplete dominance, backcross/testcross • Inheritance of ABO blood groups and Rh factor • Sex determination in humans 	14.1.0 Specific Objectives By the end of the topic, the learner should be able to: <ol style="list-style-type: none"> distinguish between continuous and discontinuous variations describe the structure and properties of chromosomes state the first law of inheritance and describe Mendel's work construct and use punnet square/checker board distinguish between F_1 and F_2 generations, genotype and phenotype, haploidy and diploidy, homozygosity and heterozygosity, dominance and recessiveness, linkage and sex linkage, mutations and mutagens predict and explain the inheritance of the ABO blood groups and Rhesus (Rh) factor state examples of genetically inherited disorders explain causes of chromosomal mutations explain the practical application of genetics. 	14.2.0 Content <ul style="list-style-type: none"> • Complete and incomplete dominance, backcross/testcross • Inheritance of ABO blood groups and Rh factor • Sex determination in humans
13.3.0 Practical activities	14.1.0 Specific Objectives By the end of the topic, the learner should be able to: <ol style="list-style-type: none"> distinguish between continuous and discontinuous variations describe the structure and properties of chromosomes state the first law of inheritance and describe Mendel's work construct and use punnet square/checker board distinguish between F_1 and F_2 generations, genotype and phenotype, haploidy and diploidy, homozygosity and heterozygosity, dominance and recessiveness, linkage and sex linkage, mutations and mutagens predict and explain the inheritance of the ABO blood groups and Rhesus (Rh) factor state examples of genetically inherited disorders explain causes of chromosomal mutations explain the practical application of genetics. 	14.2.0 Content <ul style="list-style-type: none"> • Variation within plant and animal species • Review of chromosomes • Brief mention of genes and DNA (without details of the molecular structure of genes and DNA.)
13.3.1 Examine, draw and differentiate seeds	14.2.1 Concepts of genetics <ul style="list-style-type: none"> • Variation within plant and animal species • Review of chromosomes • Brief mention of genes and DNA (without details of the molecular structure of genes and DNA.) 	14.2.1 Concepts of genetics <ul style="list-style-type: none"> • Variation within plant and animal species • Review of chromosomes • Brief mention of genes and DNA (without details of the molecular structure of genes and DNA.)
13.3.2 Determine the region of growth in shoots and roots	14.2.2 First law of heredity <ul style="list-style-type: none"> • Mendel's experiments - monohybrid inheritance (3:1 ratio) 	14.2.2 First law of heredity <ul style="list-style-type: none"> • Mendel's experiments - monohybrid inheritance (3:1 ratio)
13.3.3 Investigate hypogeal and epigeal germination	14.2.3 Sex determination in humans	14.2.3 Sex determination in humans
13.3.4 Carry out experiments to demonstrate apical dominance	14.2.4 Linkage <ul style="list-style-type: none"> • Sex linked genes, sex linked characteristics e.g. Colour blindness, Haemophilia, Hairy ears and Nose 	14.2.4 Linkage <ul style="list-style-type: none"> • Sex linked genes, sex linked characteristics e.g. Colour blindness, Haemophilia, Hairy ears and Nose
13.3.5 Observe stages of complete and incomplete metamorphosis in insects	14.2.5 Mutations <ul style="list-style-type: none"> • Types of mutations • Causes and consequences of chromosomal mutations • Gene mutations(only cover the following examples of genetic disorders: Albism, Sickle cell Anaemia, Haemophilia, Colour blindness) 	14.2.5 Mutations <ul style="list-style-type: none"> • Types of mutations • Causes and consequences of chromosomal mutations • Gene mutations(only cover the following examples of genetic disorders: Albism, Sickle cell Anaemia, Haemophilia, Colour blindness)
	14.2.6 Practical applications of genetics <ul style="list-style-type: none"> • Blood transfusion • Plant and animal breeding using artificial selection • Genetic counselling • Genetic engineering 	14.2.6 Practical applications of genetics <ul style="list-style-type: none"> • Blood transfusion • Plant and animal breeding using artificial selection • Genetic counselling • Genetic engineering
	14.3.0 Practical Activities	14.3.0 Practical Activities
	14.3.1 Measure and record heights of class members and plot the data on graphs	14.3.1 Measure and record heights of class members and plot the data on graphs
	14.3.2 Demonstrate chromosome behaviour in mitosis and meiosis by using clay / plasticine / insulated coloured wires/coloured thread	14.3.2 Demonstrate chromosome behaviour in mitosis and meiosis by using clay / plasticine / insulated coloured wires/coloured thread
	14.3.3 Carry out investigations on finger prints and tongue rolling	14.3.3 Carry out investigations on finger prints and tongue rolling

15.0.0	EVOLUTION (19 lessons)	
15.1.0	Specific Objectives	
	By the end of the topic, the learner should be able to:	
a)	explain the meaning of evolution and the current concepts of evolution	
b)	describe the struggle for existence and survival for the fittest	
c)	describe the evidences for organic evolution	
d)	explain resistance to antibiotics, fungicides and pesticides.	
15.2.0	Content	
15.2.1	Meaning of evolution	
15.2.2	The origin of life	
	• Special creation	
	• Chemical evolution	
15.2.3	(Brief explanation required) Evidences for organic evolution	
	• Fossil records - brief mention of human evolution	
	• Geographical distribution - continental drift	
	• Comparative embryology	
	• Comparative anatomy	
	(Convergent and divergent evolution based on homology and analogy)	
	• Cell biology - occurrence of cell organelles and blood pigments	
15.2.4	Mechanisms of evolution	
	• Lamarcks theory (Brief mention)	
	• Evolution by natural selection	
	• Natural selection in action e.g. peppered moth (industrial melanism)	
	• Resistance to drugs, pesticides and antibiotics	
15.3.0	Practical activities	
15.3.1	Compare vertebrate limbs	

17.0.0	SUPPORT AND MOVEMENT IN PLANTS AND ANIMALS (39 LESSONS)	
17.1.0	Specific Objectives	
	By the end of the topic, the learner should be able to:	
a)	explain the necessity of support and movement in animals and plants	
b)	describe the arrangement and the role of supporting tissues in young and old plants	
c)	list functions of the exo and endo-skeletons	
d)	describe locomotion in a named finned fish	
e)	identify the bones of the axial and appendicular skeleton in a mammal	
f)	describe the structure and functions of different types of joints in a mammal and explain how muscles bring about movement	
g)	distinguish between the different types of muscles, their locations and functions.	
16.2.3	Reception, responses and coordination in animals	
	• Components of the nervous system in a mammal	
	• Structure and functions of the neurones	
	• Functions of major parts of human brain	
	• Simple and conditioned reflex actions	
16.2.4	The role of hormones in coordination in a mammal	
	• Effects of over secretion and under secretion of adrenaline and thyroxine in humans	
	• Functional differences and similarities between endocrine and nervous systems	
16.2.5	Effects of drug abuse on the human health	
16.2.6	Structure and functions of parts of the mammalian eye (human)	
	• Accommodation, image formation and interpretations	
	• Common eye defects and their corrections	
16.2.7	Structure and functions of parts of the mammalian ear (human)	
	• Hearing (omit details of cochlea)	
	• Balance and posture (mention only parts involved)	
16.3.0	Practical activities	
16.3.1	Carry out experiments to investigate tactic responses e.g. chemotaxis - use any of the following organisms: worker termites/fly maggots/earth worms/honey bee/grasshoppers/ woodlice	
16.3.2	Carry out experiments on tropisms and etiolation	
16.3.3	Determine the distance of blind spot	
16.3.4	Carry out knee jerk experiment	
17.2.0	Content	
17.2.1	Plants	
	• Necessity for support and movement in plants	
	• Review of tissue distribution in monocotyledonous and dicotyledonous plants	
	(Histological details of tissues are not required)	
17.2.2	Animals	
	• Necessity for support and movement in animals	
	• Types and functions of the skeleton	
	- exoskeleton in arthropods	
	- endoskeleton in vertebrates	
	• Locomotion in a finned fish	
	• Identification of the bones of axial and appendicular skeletons (names and appendicular skeletons (names	

of individual bones of coccyx not required)

- 17.2.5 Types and functions of movable joints (ball and socket, hinge joint)
17.2.6 Structure, function and location of cardiac, smooth and skeletal muscles (Details of fine structure not required)
Role of muscles in movement of the arm in humans

17.3.0 Practical activities

- 17.3.1 Observe permanent slides of transverse sections of the stems of herbaceous and woody plants
17.3.2 Observe wilting in young herbaceous plants
17.3.3 Examine the exoskeleton in arthropods
17.3.4 Observe and identify external features of a finned fish
17.3.5 Examine and draw different types of bones in mammals

AGRICULTURE

SUGGESTED ASSESSMENT METHODS

1. Practical Work
2. Project work
3. Field trips
4. Oral questions
5. Quizzes
6. Written tests and examinations

INTRODUCTION

This syllabus has been compiled with a view to accomplishing two fundamental objectives. First, the learners should develop basic principles of agricultural production relevant to Kenya in general, and specifically to their own environments. Secondly, learners should be involved in practical work which aim at assisting them to acquire useful agricultural skills. Therefore, it is highly recommended that learners be involved in practical work for actual agricultural production.

Affective domain objectives in agriculture are as important as those in cognitive and psychomotor domains. However, they must not be seen as achievable at the end of each single topic. They are long term objectives and are set out in the general rather than specific objectives. The teacher must not forget them in teaching and in assessment.

The syllabus covers crop production, livestock production, farm power and machinery, farm structures, agricultural economics and agroforestry. These are distributed throughout the four-year course.

An attempt has been made to arrange the topics in a logical sequence. However, due to different ecological zones and weather patterns in the country, teachers are advised to take into account these differences when developing their schemes of work. They should also endeavour to cover the syllabus within the allocated time. In topics on crop and livestock production, teachers should select examples which are most suited to their ecological zones. It is highly recommended that a crop museum be established in each school. Students should also be encouraged to plant suitable trees in their schools and label them using common and botanical names for each tree.

Each school is encouraged to harvest its rain water from the roof catchments, hold it in reservoirs and use it for irrigation and for livestock, among other uses. Rain water harvesting does not only avail cheap water to the school, but also prevents soil erosion and undermining of building foundations. Agricultural and other related activities must not be used as punishment for wrong doers.

At the end of this syllabus are appendices on lists of tools, weeds, pests and diseases to be studied. However, teachers are encouraged to innovate and to use local resources in teaching. A guide on learner/assessment and self evaluation is given in appendix II.

GENERAL OBJECTIVES

The Secondary Agriculture course aims to:

1. develop an understanding of agriculture and its importance to the family and the nation
2. promote interest in agriculture as an industry and create awareness of opportunities existing in agriculture and related sectors.
3. demonstrate that farming is a dignified and profitable occupation
4. enhance skills needed in carrying out agricultural practices
5. provide a background for further studies in agriculture
6. develop self-reliance, resourcefulness and problem solving abilities in agriculture
7. develop occupational outlook in agriculture
8. enable schools to take an active part in national development through agricultural activities
9. create awareness of the role of agriculture in industrial and technological development
10. enhance understanding of the role of technology and industrialization in agricultural development
11. promote agricultural activities which enhance environmental conservation
12. promote consciousness of health promoting activities in agricultural production

FORM ONE

1.0.0 INTRODUCTION TO AGRICULTURE (8 Lessons)	<ul style="list-style-type: none"> - Meaning - Advantages - Disadvantages
1.1.0 Specific objectives	By the end of the topic, the learner should be able to:
	<ol style="list-style-type: none"> define agriculture state the main branches of agriculture describe farming systems explain the role of agriculture in the economy and demonstrate an appreciation of its importance to the country demonstrate an appreciation for the wide and varied opportunities in agriculture.
1.2.0 Content	
1.2.1 Definition of agriculture	
1.2.2 Branches of agriculture	<ul style="list-style-type: none"> • Crop-farming (Arable farming) <ul style="list-style-type: none"> i) Field crops ii) Horticulture <ul style="list-style-type: none"> - Floriculture (flower farming) - Olericulture (vegetable farming) • Livestock farming <ul style="list-style-type: none"> i) Pastoralism - mammalian livestock farming ii) Fish farming (Aquaculture) iii) Apiculture (Bee keeping) iv) Poultry keeping
1.2.3 Systems of farming	<ul style="list-style-type: none"> • Extensive <ul style="list-style-type: none"> - Agricultural economics - Agricultural engineering • Intensive <ul style="list-style-type: none"> - Large scale farming - Small scale farming
	<p>Note:- Study each of the above systems under:</p>
1.2.4 Methods of farming	<ul style="list-style-type: none"> • Mixed farming • Nomadic pastoralism • Shifting cultivation • Organic farming • Agroforestry
1.2.5 Roles of agriculture in the economy	<p>Note:- Learners should be reminded that any of the above methods can be subsistence or commercial</p> <ul style="list-style-type: none"> • Food supply • Source of employment • Foreign exchange earner • Source of raw materials for industries • Provision of market for industrial goods • Source of capital
2.0.0 FACTORS INFLUENCING AGRICULTURE (24 Lessons)	
2.1.0 Specific objectives	By the end of the topic, the learner should be able to:
	<ol style="list-style-type: none"> explain the human factors influencing agriculture explain biotic factors influencing agriculture explain how climatic factors influence agriculture define soil describe the process of soil formation describe soil profile determine soil constituents classify soils by physical characteristics explain chemical properties of soils

- j) relate crop and livestock distribution to soils in different regions.
- 2.2.9 Content**
- * Human factors
 - * Levels of education and technology
 - * Health - HIV/AIDS and health in general
 - * Economy (include liberalization)
 - * Transport and communication
 - * Market forces (local and international)
 - * Government policy
 - * Cultural and religious beliefs
 - * Biotic factors
 - * Pests
 - * Parasites
 - * Decomposers
 - * Pathogens
 - * Predators
 - * Pollinators
 - * Nitrogen fixing bacteria
- 2.2.3 Climatic Factors**
- * Rainfall
 - intensity
 - reliability
 - quantity
 - distribution
 - * Temperature
 - How topography and altitude affect temperature
 - How temperature influences crop and livestock production
 - * Wind
 - Evapotranspiration
 - Lodging
 - Pollination
 - Seed dispersal
 - Soil erosion (note section 21.2.1)
 - * Light
 - Intensity

- availability
- c) relate each cultivation operation to correct tools and/or implements
- d) prepare a piece of land ready for crop production.
- 3.0.0 FARM TOOLS AND EQUIPMENT (7 Lessons)**
- 3.1.0 Specific objectives**
- By the end of the topic, the learner should be able to:
- a) identify various farm tools and equipment
 - b) name parts of various farm tools and equipment
 - c) describe the use of various tools and equipment
 - d) carry out maintenance practices on tools and equipment
 - e) demonstrate an appreciation for care and maintenance of tools.

- 3.2.0 Content**
- 3.2.1 Garden tools and equipment
 - 3.2.2 Workshop tools and equipment
 - * Woodwork tools and equipment
 - * Metalwork tools and equipment
 - * Livestock production tools and equipment
 - * Plumbing tools and equipment
 - * Masonry tools and equipment
- Note:** Study the above tools under the following headings:
- Name and uses
 - Parts and uses
 - Maintenance practices (see Appendix I for list of tools and equipment to be studied)
- Note:** For each type:
- give reasons
 - explain how it is carried out

- 4.0.0 CROP PRODUCTION I (LAND PREPARATION) (7 Lessons)**
- 4.1.0 Specific objectives**
- By the end of the topic, the learner should be able to:
- a) explain the importance of land preparation
 - b) describe the various types of cultivation

- c) relate each cultivation operation to correct tools and/or implements
- d) prepare a piece of land ready for crop production.
- 4.2.0 Content**
- | | |
|--|--|
| <p>4.2.1 Land preparation</p> <ul style="list-style-type: none"> * Definition - Importance * Operations in land preparation - Clearing land before cultivation - Importance (include clearing as a method of land reclamation) - Methods and equipment | <p>4.2.2 Operations in land preparation</p> <ul style="list-style-type: none"> * Clearing land before cultivation - Importance (include clearing as a method of land reclamation) - Methods and equipment |
|--|--|

<p>5.0.0</p> <p>WATER SUPPLY, IRRIGATION AND DRAINAGE (10 Lessons)</p>	<p>5.1.0 Specific objectives</p> <p>By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) state the sources of water for the farm b) describe collection, storage, pumping, and conveyance of water; c) describe water treatment and explain its importance d) define irrigation e) explain the importance of irrigation f) describe methods of irrigating land g) list the equipment used in irrigation h) grow a crop through irrigation i) carry out maintenance on irrigation equipment and facilities j) define drainage k) explain the importance of drainage l) describe the methods of drainage m) explain how agricultural activities pollute water and how this can be prevented n) demonstrate an appreciation for clean water in farming and life in general. 	<p>- Methods</p> <ul style="list-style-type: none"> - Importance • Uses of water on the farm <p>5.2.2 Irrigation</p> <ul style="list-style-type: none"> • Definition • Importance (include irrigation as a method of land reclamation) • Methods - surface - sub-surface - overhead - drip 	<p>e) explain the importance of organic matter in the soil</p> <p>f) describe the different organic manures</p> <p>g) prepare compost manure</p> <p>h) demonstrate a caring attitude towards soil.</p>	<p>d) state the origin of various livestock breeds</p> <p>e) classify the various breeds into types</p> <p>f) name the external parts of the various livestock species</p> <p>g) demonstrate an appreciation of the socio-economic value of livestock.</p>
			<p>6.2.0 Content</p> <p>6.2.1 Soil fertility</p> <ul style="list-style-type: none"> • Definition • How soil loses fertility • Maintenance of soil fertility 	<p>7.2.0 Content</p> <p>7.2.1 Importance of livestock</p> <p>7.2.2 Livestock species</p> <ul style="list-style-type: none"> • Cattle - Exotic - Indigenous • Goats • Sheep • Pigs • Poultry (chicken) • Rabbits • Camels
			<p>Note: Discuss advantages and disadvantages of each method</p> <p>Maintenance practices of each irrigation system</p> <p>5.2.3 Project on crop production through any method of irrigation</p> <p>5.2.4 Drainage</p> <ul style="list-style-type: none"> • Definition • Importance (include as a method of land reclamation) • Methods of drainage - Sub-surface - Pumping - Planting of appropriate trees - Surface <p>5.2.5 Water Pollution</p> <ul style="list-style-type: none"> • Meaning • Agricultural practices that pollute water • Methods of pollution prevention and control 	<p>Discuss each under the following:</p> <ul style="list-style-type: none"> • Breed origin and characteristics • Type of each breed • External parts of each livestock species • Typical conformation <p>Note: For each type, describe its preparation, advantages and disadvantages and use</p> <p>6.2.3 Compost manure:</p> <ul style="list-style-type: none"> • Meaning • Materials used and materials to avoid • Preparation methods and procedure - Heap - Pit
				<p>7.0.0 LIVESTOCK PRODUCTION I (COMMON BREEDS) (7 Lessons)</p>
				<p>8.0.0 AGRICULTURAL ECONOMICS I (BASIC CONCEPTS AND FARM RECORDS) (7 Lessons)</p>
				<p>8.1.0 Specific objectives</p> <p>By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) define economics and agricultural economics b) explain basic concepts of economics c) describe the importance of agricultural economics

- 10.2.0 Content**
- 10.2.1 Types of planting materials
 - Seeds
 - Description
 - Advantages
 - Disadvantages
 - Vegetative materials
 - Description
 - Advantages
 - Disadvantages
 - Plant parts used for vegetative propagation
 - Slips
 - Splits
 - Bulbils
 - Crowns
 - Suckers
 - Tubers
 - Vines
 - Cuttings and setts
- 10.2.2 Selection of planting materials
 - Suitability to ecological conditions (use maize hybrids and coffee varieties as examples)
 - Purity
 - Germination percentage
 - Certified seeds
- 10.2.3 Preparation of planting materials
 - Breaking dormancy
 - Disease and pest control/seed dressing
 - Seed innoculation
 - Chitting
- 10.2.4 Planting
 - Timing
 - Factors to consider
 - Advantages of timely planting
 - Methods of planting
 - Broadcasting
 - Row planting
 - Oversowing (refer to pastures- 25.2.1)
 - Undersowing

- Note:** Give appropriate crop for each method
- 10.2.5 Plant population
 - spacing
 - factors to consider
 - seed rates
 - factors to consider calculation of plant population per unit area.
- 10.2.6 Depth of planting
 - factors to consider
- Note:** Learners should:
 - carry out the above practices
 - develop a table showing spacing for different local crops
- 11.0.0 CROP PRODUCTION III (NURSERY PRACTICES) (16 Lessons)**

- 11.2.0 Content**
- 11.2.1 Nursery bed
 - Definition
 - Difference between a nursery bed, seedling bed and a seed bed
 - Importance
 - Site selection
 - Nursery establishment
 - i) Vegetable nursery
 - ii) Tree nursery
 - iii) Vegetative propagation nursery (tea as an example)
 - use of sleeves and other innovations for growing young plants making and using seedling boxes for growing young plants - preparation of rooting medium
 - preparation of cuttings
- 11.2.2 Routine management in raising seedlings
 - Seed drilling
 - Mulching
 - Watering
 - Shading
 - Pricking out
 - Hardening off
 - Weed control
 - Pest control
 - Disease control
- 11.2.3 Budding
 - Meaning
 - Methods and procedure
 - Appropriate plants
 - Appropriate tools and materials

- 11.2.4 Grafting
 - Meaning
 - Methods and procedure
- 12.0.0 CROP PRODUCTION IV (FIELD PRACTICES) (14 Lessons)**
- 12.0.0 Specific objectives**
- By the end of the topic, the learner should be able to:
 - a) describe a nursery bed
 - b) distinguish between a nursery bed, a seedling bed and a seed bed
 - c) state the importance of a nursery bed
 - d) select a suitable site for a nursery
 - e) prepare a nursery bed
 - f) manage a nursery bed
 - g) transplant crops from a nursery
 - h) bud a seedling
 - i) graft a seedling
 - j) explain the importance of budding, grafting, layering and tissue culture
 - k) describe damage caused by animals on tree seedlings and how to prevent it.
- 12.0.0 CROP PRODUCTION IV (FIELD PRACTICES) (14 Lessons)**
- Note:** Learners to practice budding of orange scions on Lemon root-stocks or other appropriate plants.
- 12.0.0 Specific objectives
- By the end of the topic, the learner should be able to:
 - a) define crop rotation
 - b) state the importance of crop rotation
 - c) draw a crop rotation programme
 - d) distinguish terms used in crop farming

- e) state the importance of mulching in crop production
- f) describe the importance of various field practices in crop production
- g) carry out various field practices
- h) state the correct stage for harvesting various crops
- i) describe harvesting practices for various crops.

12.2.0 Content

12.2.1 Crop rotation

- Definition
- Importance
- Factors influencing crop rotation
- Rotational programmes
- Terms used in crop production
- Monocropping
- Intercropping
- Mixed cropping
- Meaning
- Importance
- Types of mulching materials
 - organic
 - inorganic
- Advantages and disadvantages of mulching materials

12.2.6 Post - harvest practices:

- Threshing/shelling
- Drying
- Cleaning
- Sorting and grading
- Dusting
- Packaging

12.2.7 Storage

- Importance
- Types of storage
- Preparation of store

13.0.0 CROP PRODUCTION V (VEGETABLES) (16 Lessons)

13.1.0 Specific objectives

- By the end of the topic, the learner should be able to:
- a) grow a vegetable crop from nursery establishment to harvesting
 - b) keep crop production records
 - c) market farm produce
 - d) demonstrate an appreciation of agriculture as an

- e) economically lucrative activity.

- f) state the importance of maintaining livestock healthy
- g) demonstrate a caring attitude towards livestock

13.2.0 Content

- 13.2.1 Vegetable crops
 - Tomatoes - use varieties that require pruning and staking.
 - Carrots
 - Onions
 - Cabbages/kales

Note:

- Each student should grow at least one of the above crops keeping all the necessary records
- The teacher should organise the class in such a way that there are students growing each of the crops
 - Class discussions should be organised so that students tell and demonstrate to each other their work in the different vegetable crops. Discussion may be held at the crop plots for students to observe.

14.2.0 Content

14.2.1 Health and disease

- Definitions
- Importance of keeping livestock healthy
- Pre-disposing factors of livestock diseases
- Signs of ill - health in livestock

14.2.2 Classification of livestock diseases by cause

- 14.2.3 General methods of disease control
- 14.2.4 Appropriate methods of handling livestock

15.0.0 LIVESTOCK HEALTH II (PARASITES) (16 Lessons)

15.1.0 Specific objectives

- By the end of the topic, the learner should be able to:
- a) describe host-parasite relationship
 - b) identify different parasites
 - c) describe the life-cycle of parasites
 - d) explain methods of parasite control in livestock.

15.2.0 Content

- 15.2.1 Host - parasite relationship
 - effects of parasites on hosts
- 15.2.2 External parasites
 - Ticks
 - Tsetse flies
 - Mites
 - Lice
 - Fleas
 - Keds
- 15.2.3 Internal parasites
 - Roundworms (Ascaris spp)

- Tapeworms (*Taenia* spp)
- Flukes (*Fasciola* spp)

- f) demonstrate a caring attitude towards livestock.

Note:

- The parasites in 15.2.2 and 15.2.3 should be studied under the following:-
- i) Identification
- ii) Livestock species attacked
- iii) Part(s) of livestock attacked or inhabited and mode of feeding
- iv) Signs and symptoms of attack
- Describe the life cycles of the following:-
- i) Roundworm (*Ascaris* spp.)
- ii) Tapeworm (*Taenia* spp)
- iii) Liver Fluke (*Fasciola* spp.)
- iv) Ticks, appropriate examples of:
 - one - host
 - two - host
 - three - host

Note: Indicate whether soft or hard tick

- State methods of parasite control giving appropriate example of a parasite for each method

16.0.0 LIVESTOCK PRODUCTION II (NUTRITION) (12 Lessons)

16.1.0 Specific objectives

- By the end of the topic, the learner should be able to:
- identify and classify livestock feeds
 - describe digestion and digestive systems of cattle, pig and poultry
 - define terms used to express feed values
 - compute a livestock ration
 - prepare balanced ration for various livestock

16.2.0 Content

- 16.2.1 Livestock nutrition
 - Feeds and Feeding
 - Identification
 - classification of feeds
 - Terms used in expressing feed values
 - Computation of livestock rations
 - Preparation of livestock rations
 - Digestive systems.
 - Ruminant (cattle)
 - Non-ruminant (pig and poultry)
 - Digestion in cattle, pig and poultry
- 16.2.2 Appropriate livestock handling techniques while feeding

16.2.0 Content

- 16.2.1 Livestock nutrition
 - Feeds and Feeding

- Identification
- classification of feeds
- Terms used in expressing feed values
- Computation of livestock rations
- Preparation of livestock rations

- Digestive systems.
 - Ruminant (cattle)
 - Non-ruminant (pig and poultry)

- Digestion in cattle, pig and poultry

- 16.2.2 Appropriate livestock handling techniques while feeding

16.2.0 Content

16.2.1 Livestock nutrition

(12 Lessons)

16.2.0 Content

16.2.1 Livestock nutrition

(12 Lessons)

16.2.0 Content

16.2.1 Livestock nutrition

(12 Lessons)

FORM THREE

17.0.0 LIVESTOCK PRODUCTION III (SELECTION AND BREEDING) (12 Lessons)

17.1.0 Specific objectives

By the end of the topic the learner should be able to:

- describe reproduction and b) reproductive systems,
- select breeding stock
- describe breeding systems
- identify signs of heat in livestock
- describe methods used in serving livestock
- demonstrate a caring attitude towards livestock

17.2.0 Content

17.2.1 Reproduction and reproductive systems.

- Cattle
- Pigs
- Rabbits

Note: Discuss advantages and disadvantages of each.

17.2.4 Signs of heat in:

- Cattle
- Pigs
- Rabbits

Note: Study the oestrus cycle of each of the above

17.2.5 Methods of service in livestock

- Natural mating
- Artificial insemination
- Embryo transplant

Note: Discuss advantages and disadvantages of each.

17.2.6 Signs of parturition

- Cattle
- Pigs
- Camels

Note: Learners to handle livestock in appropriate caring manner.

17.2.2 Selection:

- meaning
- Factors to consider in selecting a breeding stock

- Cattle
- Sheep
- Goats
- Pigs

Note: Discuss advantages and disadvantages of each.

17.2.3 Breeding

18.0.0 LIVESTOCK PRODUCTION IV (LIVESTOCK REARING PRACTICES) (10 Lessons)

18.1.0 Specific Objectives

By the end of the topic the learner should be able to:

- describe livestock rearing practices
- carry out livestock rearing practices
- demonstrate a caring attitude towards livestock.

FORM THREE

17.0.0 LIVESTOCK PRODUCTION III (SELECTION AND BREEDING) (12 Lessons)

17.1.0 Specific objectives

By the end of the topic the learner should be able to:

- discuss under the headings:-
- Definition
- Advantages
- Disadvantages

17.2.0 Content

Discuss under the headings:-

- Inbreeding
- Line breeding
- Out-crossing

17.2.4 Signs of heat in:

- Definition
- Advantages
- Disadvantages

17.2.5 Methods of service in livestock

- Artificial insemination
- Embryo transplant

17.2.6 Signs of parturition

- Cattle
- Pigs
- Rabbits

Note: Discuss advantages and disadvantages of each.

17.2.2 Selection:

- meaning
- Factors to consider in selecting a breeding stock

- Cattle
- Sheep
- Goats
- Pigs

Note: Discuss advantages and disadvantages of each.

17.2.3 Breeding

- Meaning
- Terms used in breeding

- Dominant and recessive genes
- Heterosis(hybrid vigour)
- Epistasis

17.2.3 Breeding

- Breeding systems

18.2.0 Content	
18.2.1 Routine livestock rearing practices	
• Feeding practices	
- Flushing	
- Creep feeding	
• Parasites and disease control practices	
- Steaming up	
- Vaccination	
- Deworming	
- Hoof trimming	
- Docking	
- Dipping/spraying	
- Dusting	
• Breeding practices	
- Crutching	
- Tupping and serving	
- Raddling	
- Ringing	
• Identification	
- Debeaking	
- Tooth clipping	
• Culling: Describe general methods and carry out practicals on:	
- Cattle	
- Poultry	
• Dehorning	
• Shearing	
• Castration	
- open	
- closed	
- caponization	
• Management during parturition-	
- Pigs	
- Cattle	
- Sheep	
- Goats	
- Rabbits	
18.2.2 Bee Keeping (Apiculture)	
• Importance	
• Colony	
- Siting of the apiary and hive	
- Stocking the bee hive	
• Management:	
- Feeding	
- Predator and pest control	

18.2.3 Fish Farming (aquaculture)	
• Importance	
• Types of fish kept in farm ponds	
- Management	
- Harvesting	
• Processing and preservation practices	
- Appropriate handling of livestock during routine management	
19.0.0 FARM STRUCTURES (18 Lessons)	
19.1.0 Specific Objectives	
By the end of this topic, the learner should be able to:	
a) describe parts of a building	
b) identify materials for construction	
c) describe various farm structures and their uses	
d) describe siting of various structures	
e) construct and maintain farm structures.	
19.2.0 Content	
19.2.1 Farm buildings and structures	
• Siting	
- Parts of a building	
- Foundation	
- Wall	
- Floor	
- Roof	
19.2.2 Livestock buildings and structures	
• Crushes	
- Dips	
- Spray race	
- Dairy shed/parlour	
- Calf pens	
• Poultry houses and structures	
- Deep litter	
- Coops	
- Folds/Arks	
- Runs	
- Battery cages	
• Rabbit hutches/Rabbitry	
- Pigsty/pig sty	
19.2.3 Fish ponds	
• Silos (for silage)	
• Zero grazing unit	
• Bee hives	
19.2.4 Green house	
• Meaning	
• Construction materials	
• uses	
19.2.5 Fences in the farm	
• Types of fences and materials used	
• Uses - advantages and disadvantages	
• Gates and passes in fences	
• Fence reinforcements	
Note	
- Construct either of the following structures:	
i) a crush	
ii) a beehive	
iii) a hutch	
- Visit nearby construction sites for observation.	
20.0.0 AGRICULTURAL ECONOMICS II (LAND TENURE AND LAND REFORM) (8 Lessons)	
20.1.0 Specific objectives	
By the end of the topic, the learner should be able to:	
a) define the term tenure	
b) describe tenure systems	
c) describe land reforms.	
20.2.0 Content	
20.2.1 Land tenure	
• definition	
• tenure systems	
(i) individual	
- Types	
- Advantages and disadvantages	
(ii) collective	
- Description	
- Advantages	
- Disadvantages	
20.2.2 Land reforms	
• Definition	
• Types of reform and reasons for each	
- Fragmentation	
- Consolidation	
- Adjudication	
- Registration (Emphasize the importance of a title deed)	
- Settlement and resettlement	
21.0.0 SOIL AND WATER CONSERVATION (19 Lessons)	
21.1.0 Specific objectives	
By the end of the topic, the learner should be able to:	
a) define soil erosion	
b) explain the various factors that influence erosion	
c) list the agents of erosion	
d) describe the various types of erosion	
e) describe various methods of erosion control	
f) demonstrate a caring attitude towards soil and water	
g) carry out soil erosion control measures	
h) describe water harvesting and conservation techniques	
i) describe micro-catchments and their uses.	
j) Design and construct a micro-catchment.	
21.2.0 Content	
21.2.1 Soil erosion	
• Definition	
• Factors influencing erosion -	
- Land use and ground cover	
- Topography - gradient and length of slope (horizontal and vertical intervals)	

		<ul style="list-style-type: none"> • Classification of diseases according to cause • Identification of common diseases • Disease control • Harmful effects of diseases • Disease control measures (see appendices III and IV for pests and diseases to be studied) <p>Note: Remind learners of safety in mixing, using and storing of chemicals including container disposal as in unit 22.00)</p>
		<p>22.2.2 Weed control methods</p> <ul style="list-style-type: none"> • Chemical weed control: <ul style="list-style-type: none"> - Classes of herbicides - Methods of application - Safety measures in use of chemicals • Mechanical weed control • Cultural weed control • Biological weed control • Legislative control
		<p>23.0.0 CROP PESTS AND DISEASES</p> <p>(14 Lessons)</p> <p>23.1.0 Specific objectives</p> <p>By the end of the topic, the learner should be able to:</p> <ol style="list-style-type: none"> define pest and disease state the main causes of crop diseases describe the harmful effects of crop pests and diseases identify and classify some of the common pests and diseases carry out general disease and pest control measures demonstrate a caring attitude towards the environment while controlling pests and diseases.
		<p>22.0.0 WEEDS AND WEED CONTROL</p> <p>(15 Lessons)</p> <p>22.1.0 Specific objectives</p> <p>By the end of the topic, the learner should be able to:</p> <ol style="list-style-type: none"> define a weed identify weeds classify weeds explain the characteristics which make the weeds competitive describe ways of controlling weeds state harmful effects of weeds control weeds exercise safety measures to oneself, to crops and to the environment while controlling weeds.
		<p>21.2.2 Water harvesting</p> <ul style="list-style-type: none"> • Roof catchment • Rock catchment • Weirs and dams • Ponds • Retention ditches/Level terraces
		<p>22.2.0 Contents</p> <p>22.2.1 Weeds</p> <ul style="list-style-type: none"> • Definition of weed • Weed identification and classification competitive ability of weeds (Appropriate examples for each ability) <p>23.2.2 Diseases:</p> <ul style="list-style-type: none"> • Definition

- 24.2.2 Rice production**
- Land preparation
 - Water control
 - Use of flooding in ricefield
 - Fertilizer application
 - Weed control

- 24.2.3 Harvesting of the following crops**
- Cotton
 - Pyrethrum
 - Sugarcane
 - Tea
 - Coffee

Under the following

- Stage of harvesting
- Method and procedure of harvesting
- Precautions in harvesting

Note:
Compare cost of production with value of product for maize/sorghum/millet and beans

Discuss why there is a loss or a profit and improvement needed.

25.0.0 FORAGE CROPS (9 Lessons)

25.1.0 Specific objectives

By the end of the topic, the learner should be able to:

- define and classify pastures
- identify forage crops
- describe the ecological requirements of forage crops
- describe the establishment and management of pastures and fodder
- describe forage utilization and conservation.

25.2.0 Content

- 25.2.1 Pastures**
- Definition
 - Classification
 - Establishment
 - Management

- 25.2.2 Utilization**
- Grazing systems
 - Rotational
 - Herding
 - Zero grazing

25.2.3 Fodder crops

- Napier/bana grass
- Guatemala grass
- Sorghum
- Kale
- Edible cana
- Lucerne
- Clovers
- Desmodium
- Manigolds
- Agroforestry trees/bushes used as fodder

Under the following:

- Ecological requirements
- Establishment and management
- Production per unit area
- Utilization

- 25.2.4 Forage conservation**
- Hay making
 - Silage making
 - Standing hay

26.0.0 LIVESTOCK HEALTH III (DISEASES) (20 Lessons)

26.1.0 Specific objectives

By the end of the topic, the learner should be able to:

- describe causes and vectors of main livestock diseases
- state the incubation period of the livestock diseases
- describe the signs of each disease
- state the predisposing factors where applicable
- carry out simple control measures of livestock diseases
- demonstrate a caring attitude towards livestock

Note

- Learners to exercise care and use appropriate livestock handling practices
- Exercise care not to pollute the environment with chemicals

26.2.0 Content

- 26.2.1 Protozoan diseases**
- East coast fever
 - Anaplasmosis
 - Coccidiosis
 - Trypanosomiasis(Nagana)

26.2.2 Bacterial diseases

- Fowl typhoid
- Foot rot
- Contagious abortion(Brucellosis)
- Scours
- Black-quarter
- Mastitis
- Anthrax
- Pneumonia
- Viral diseases
- Rinderpest
- Foot and mouth
- Newcastle
- Fowl pox
- Gunthoro
- African Swine fever
- Milk fever
- Bloat

The above diseases should be studied under the following:

- Animal species attacked
- Cause/causal organism/agent and/or vector
- Predisposing factors(where applicable)
- Incubation period (where applicable)
- Signs and symptoms of disease
- Simple control measures of the diseases

FORM FOUR

<p>27.0.0 LIVESTOCK PRODUCTION V (POULTRY) (25 Lessons)</p> <p>27.1.0 Specific objectives</p> <p>By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) identify parts of an egg b) select eggs for incubation c) identify suitable sources of chicks d) describe broodiness and natural brooding e) describe brooder and brooder management f) describe conditions necessary for artificial incubation g) describe rearing systems h) describe the feeding for each age and category of poultry i) identify stress and vices j) state the causes of stress and vices in poultry k) state the effects of vices and stress in poultry l) state control measures of vices and stress m) describe marketing of eggs and poultry meat n) select, sort and grade eggs for marketing o) demonstrate an appreciation of poultry production as an economically lucrative activity. 	<ul style="list-style-type: none"> - Preparation and management of natural incubation - Artificial incubation - Management of the incubator Sources of chicks Brooding <ul style="list-style-type: none"> • Meaning • Natural brooding • Artificial brooding - Brooder and brooder management - Conditions - Equipment - Management of:- i) layers ii) broilers Rearing systems <ul style="list-style-type: none"> • Extensive • Free range • Semi - intensive - Fold system - Intensive - Deep litter - Battery cage system 	<p>27.2.0 Content</p> <p>27.2.1 Parts of an egg</p> <p>27.2.2 Incubation</p> <p>• Meaning</p> <p>• Selection of eggs for incubation</p> <p>• Natural incubation</p> <p>- Signs of broodiness in poultry</p>	<p>Note: Include advantages and disadvantages of each system.</p> <p>27.2.6 Chicken feeding</p> <ul style="list-style-type: none"> • Broilers • Layers <p>27.2.7 Stress and vices in chicken.</p> <ul style="list-style-type: none"> • Identification • Causes • Control <p>27.2.8 Marketing</p> <ul style="list-style-type: none"> • eggs - include, grading of eggs for marketing • meat 	<p>28.0.0 LIVESTOCK PRODUCTION VI (CATTLE) (16 Lessons)</p> <p>28.1.0 Specific objectives</p> <p>By the end of the topic, the learner should be able to:</p> <ul style="list-style-type: none"> a) raise young stock b) demonstrate a caring attitude towards livestock c) describe milk by its components d) describe milk secretion and let - down e) milk using correct procedure and technique f) describe marketing of beef cattle and milk g) Demonstrate an appreciation of cattle production as an economically lucrative activity. 	<p>28.2.0 Content</p> <p>28.2.1 Raising young stock</p> <ul style="list-style-type: none"> • Feeding • Weaning • Housing • Routine practices (see unit 18) <p>28.2.2 Milk and Milking</p> <ul style="list-style-type: none"> • Milk composition • Milk secretion and let down • Clean milk production - Equipment and materials (include milking machine) - Cleanliness of the milkman / milkwoman - Milking procedure (by hand and by machine) - Milking techniques - Dry cow therapy 	<p>29.0.0 FARM POWER AND MACHINERY (18 Lessons)</p> <p>29.1.0 Specific objectives</p> <p>By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) describe various sources of Power in the farm b) describe various systems of a tractor c) describe the various tractor implements, their uses and maintenance d) describe the various animal drawn implements, their uses and maintenance e) describe tractor service and maintenance practices. 	<p>29.2.0 Content</p> <p>29.2.1 Sources of power in the farm</p> <ul style="list-style-type: none"> • Human • Animal • Wind • Water • Biomass - Wood/charcoal - Biogas • Fossil fuel - Coal - Petroleum - Natural gas • Electrical - Hydro - Geothermal - Nuclear - Storage battery • Solar • Tractor Engine • Four stroke cycle engine - diesel - petrol
<p>Note: Learners to exercise care and use appropriate methods while handling poultry</p>	<p>28.2.3 Marketing of milk</p>						
<p>Note: Learners to exercise care and use appropriate methods while handling livestock</p>	<p>28.2.4 Marketing beef cattle</p>	<p>Note: Learners to exercise care and use appropriate methods in handling livestock</p>					

29.2.3	<ul style="list-style-type: none"> • Two stroke cycle engine • Systems of the tractor • Fuel system • Electrical • Ignition • Cooling • Lubrication • Transmission • Clutch • Gears • Differential • Final Drive <p>Note : Teacher should use local resources and diagrams. The school does not need to have tractor, tractor drawn implements, animals and animal drawn implements.</p>	<ul style="list-style-type: none"> • Carts • Ridders 	<p>31.0.0 AGRICULTURAL ECONOMICS IV (FARM ACCOUNTS) (10 Lessons)</p>	<ul style="list-style-type: none"> - Methods of acquisition • Labour <ul style="list-style-type: none"> - Definition - Types - Measures of labour - Ways of increasing labour efficiency • Capital <ul style="list-style-type: none"> - Definition - Types - Sources • Management <ul style="list-style-type: none"> - Definition - Role of a farm manager 	<p>31.1.0 Specific objectives</p> <p>By the end of the topic, the learner should be able to:</p> <ol style="list-style-type: none"> state the importance of farm accounts distinguish and describe the various financial documents and their uses prepare and analyse financial statements identify various books of accounts and their uses.
29.2.4	Tractor service maintenance	29.2.5	Tractor drawn implements, their uses and maintenance.	<p>30.0.0 AGRICULTURAL ECONOMICS III (PRODUCTION ECONOMICS) (20 Lessons)</p>	<p>30.1.0 Specific objectives</p> <p>By the end of the topic, the learner should be able to:</p> <ol style="list-style-type: none"> explain various parameters of national development to relate national development to agricultural production state the factors of production and explain how each affects production describe how the law of diminishing returns relates to agricultural production describe agricultural planning and budgeting in a farm business state sources of agricultural support services describe risks and uncertainties in farming explain ways of adjusting to risks and uncertainties.
29.2.6				<p>30.2.0 Content</p>	<p>30.2.3 Production function.</p> <ul style="list-style-type: none"> • Increasing returns • Constant returns • Decreasing returns <p>30.2.4 Economic laws and principle</p> <ul style="list-style-type: none"> • The law of diminishing returns • The law of substitution • The law of equi-marginal returns • Principle of profit maximization <p>30.2.5 Farm planning</p> <ul style="list-style-type: none"> • meaning • factors to consider • steps <p>30.2.6 Farm budgeting</p> <ul style="list-style-type: none"> • Definition • Importance • Types • Partial • Complete
29.2.7				<p>30.2.1 National income</p> <ul style="list-style-type: none"> • Household - firm relationship • Gross Domestic product (GDP) • Gross National Product (GNP) <p>30.2.2 Factors of production</p> <ul style="list-style-type: none"> • Per Capita Income • Contribution of agriculture to national development • Land • Shellers 	<p>30.2.8 Risks and uncertainties in farming</p> <ul style="list-style-type: none"> • Meaning • Common risks and uncertainties • Ways of adjusting
29.2.8	Animal drawn implements, uses and maintenance.	29.2.9		<p>30.2.2 Factors of production</p> <ul style="list-style-type: none"> • Land • Ploughs 	<p>30.2.9 Specific objectives</p> <p>By the end of the topic, the learner should be able to:</p> <ol style="list-style-type: none"> Methods of acquisition Definition Types Measures of labour Ways of increasing labour efficiency Capital Definition Types Sources Management Definition Role of a farm manager

- a) define market and marketing
 b) describe the various types of markets
 c) describe how the law of supply and demand affects the prices of agricultural products
 d) state various marketing functions, agents and institutions
 e) identify problems in marketing of agricultural products
 f) list various agricultural organizations
 g) describe the role of each of the agricultural organizations
- 32.2.0 Content**
- 32.2.1 Market and marketing
 - 32.2.2 Types of markets
 - 32.2.3 Demand, supply and price theory
 - 32.2.4 Marketing functions
 - 32.2.5 Problems of marketing agricultural products and possible solutions
 - 32.2.6 Marketing boards, agents and institutions
 - 32.2.7 Co-operatives
 - Formation
 - Functions
 - 32.2.8 Associations and unions
 - Agricultural society of Kenya (ASK)
 - Young Farmers Clubs (YFC)
 - Kenya National Farmers Union (KNFU)
 - Agricultural based Women groups.
- 33.0.0 AGROFORESTRY (10 Lessons)**
- 33.1.0 Specific objectives**
- By the end of the topic, the learner should be able to:
- a) define agro forestry
 - b) state the importance of agro forestry
 - c) describe various forms of agro forestry
 - d) explain the importance of trees
 - e) select appropriate trees for different uses
- 33.2.6 Agro forestry practices**
- Alley cropping
 - Multi-storey cropping
 - Woodlots in farms
- 33.2.7 Sites for agro forestry trees**
- Boundaries
 - River banks
 - Terraces
 - Slopes
 - Homestead
- 33.2.8 Tree harvesting methods**

APPENDIX I - RESOURCES

A TOOLS AND EQUIPMENT TO BE STUDIED

1. GARDEN TOOLS AND EQUIPMENT TO BE STUDIED

panga	knap -sack sprayer
axe	sprinkler
mattock/pick axe	hose pipe
jembe/hoe	garden shear
fork jembe	pruning saw
spade	pruning knife
wheelbarrow	meter rule
	secateurs
watering can	garden trowel
spring balance	garden fork
rake	pruning - hook
tape measure	levelling boards
soil auger	

2. LIVESTOCK PRODUCTION TOOLS AND EQUIPMENT

elastrator	stir-up pump
burdizzo	milk chum
	strainer/sieve
	thermometer
halter	rope
hoof trimmer	milking stool
strip cup	weighing balance
trochar and canular	hot iron
hard broom	teeth clipper
wool shears	drenching gun
ear notcher	dosing gun
bull ring and lead stick	bohus gun
bucket	dehorning wire
	chaff cutter

3. WORKSHOP TOOLS AND EQUIPMENT

jack plane	cross cut saw
scraper	tenon/back saw
try square	copying saw
wood clamp	compass saw/key hole saw
sash clamp	rip saw
clamp	bow saw
mallet	hack saw
soldering gun	wood chisel
tin -snip	cold chisel
claw hammer	files and rasps
paint brush	wire brush

marking gauge	ball-pein hammer
divider	sledge hammer
centre punch	wire strainer
spoke shave	pliers
screw drivers	brace and bits
spanners	hand drills and bits
pipe wrench	riveting machine
pipe cutter	crowbar
levelling rod	masons square
spirit level	plumb bob
mason	trowel
wood float	metal float
meter rule	shovel

B. WEEDS TO BE STUDIED

COMMON NAME	BOTANICAL NAME
I. Black Jack	<i>Bidens pilosa</i>
2. Mexican marigold	<i>Tagetes minuta</i>
3. Oxalis/sorrel	Oxalis species
4. Double thom	<i>Oxygonum sinuatum</i>
5. Thorn apple	<i>Datura stramonium</i>
6. Couch grass	<i>Digitaria scalarium</i>
7. Nut grass	<i>Cyperus rotundas</i>
8. Wandering Jew	<i>Commelinia benghalensis</i>
9. Sow thistle	<i>Sonchus oleraceus</i>
10. Devil's horsehip	<i>Achyranthes aspera</i>
II. Macdonald's eye/gallant soldier	<i>Gallinsoga parviflora</i>
12. Sodom apple	<i>Solanum incanum</i>
13. Black nightshade	<i>Solanum nigrum</i>
14. Chinese lantern	<i>Nicandra physalodes</i>
15. Bracken fern	<i>Pteridium aquilinum</i>
16. Love grass/Bristly foxtail	<i>Setaria verticillata</i>
17. Cleavers	<i>Gallium spurium</i>
18. Stinging nettle	<i>Urtica dioica</i>
19. Fat hen/Goosefoot	<i>Chenopodium species</i>
20. Rape Weed	<i>Brassica napus</i>
21. Wild Oats	<i>Avena fatua</i>
22. Lantana/Tick berry	<i>Lantana camara</i>
23. Water hyacinth	<i>Eichornia crassipes</i>
24. Witchweed	<i>Striga hermonthica</i>
25. Creeping indigo	<i>Indigofera spicata</i>

C. CROP PESTS TO BE STUDIED

1. Armyworm
2. Cut worm
3. Locust
4. Moths
5. Fruity
6. Mealybug
7. Thrips
8. Beetles
9. Weavils - field and store
10. Birds - Weaver, Sudan dioch, Mouse bird
11. Rodents - Squirrels, Moles and Rats
12. Boll worms
13. Stainers
14. Nematodes
15. Leaf miners
16. Aphids
17. Stalk borers
18. Loopers
19. Scales

D. CROP DISEASES TO BE STUDIED

10. Cigar end rot
11. Mildew
12. Mosaic
13. Die back
14. Greening
15. Tristeza
16. Wilts - Fusarium and Bacterial
17. Black arm
18. Damping off
19. Coffee Berry Disease
20. Rosette
21. Ratton stunting disease
22. Armillaria root-rot
1. Maize streak
2. Smuts
3. Blasis
4. Leaf blight
5. Anthracnose
6. Rusts - in cereals and leaf rust in coffee
7. Leaf spot
8. Blight - halloow, early and late
9. Panama disease

APPENDIX II

EVALUATION

It is important for the teacher to evaluate his teaching and to assess learners performance. Both of these measurements can be carried out by determining the extent to which the intended objectives have been achieved by the end of each topic.

At the beginning of each topic, a list of specific objectives is given. Note that the stem of each list of objectives states: - “**By the end of the topic, the learner should be able to:**” perform a certain task. Each specific objective then starts with a verb which gives the task that the learner should be able to perform by the end of the topic.

“**By the end of the topic, the learner should be able to:**” perform a certain task. Each specific objective then starts with a verb which gives the task that the learner should be able to perform by the end of the topic.

Such verbs include:

- State
- Explain
- Describe
- Relate
- Distinguish
- Prepare
- Carry out

A good assessment therefore will attempt to determine whether the learner is able to perform the task expressed by the verb. The objectives are meant to serve certain purposes:-

- 1) They guide the teacher to determine what the learner is expected to do. In some cases when the objectives are very specific they may demand the determination of extent to which the learner is able to perform a task e.g. the learner should be able to complete milking a cow within seven minutes is different from “the learner should be able to milk a cow”
- In the first objective, assessment will not only be on the ability to milk but

also within what time. Grades may then be allocated for performance of the task and for the time it takes.

2. They guide the teacher on the methodology for example, if the task is that the learner be able to explain something, then the teacher may use lecture or discussion method.

If the task is to **prepare** e.g. a nursery bed, then the methodology will be a demonstration followed by a practical.

- 3 They guide on the method of assessment i.e. if the task was to **state**, then the learner should be asked to **state** but not to **explain**.

If on the other hand, the objective required learners to **describe**, the question should read, **describe** but not **demonstrate**

The teacher must therefore always get the **verb** in the objective to ask the question.

- 4 They guide on the depth of coverage e.g. **name** the tick that carries ECF is shallower than **describe** the tick that carries ECF.

Therefore if the objective states that the learner should be able to name, then description is not called for.

5. The teacher is able to evaluate his/her teaching through assessment of learners. The number of learners able to perform the task(s) set out in the objective(s) to a certain extent by the end of the specified time that is end of topic, shows how effective the teaching has been. The results of such an evaluation can help the

teacher to determine what changes are required in future teaching such as, changes in:-

- Teaching methods
- Teaching resources
- Time given per content area

It is recommended that the teacher carries out continuous assessment. Since, the specific objectives state that learners should be able to perform certain task(s) by **the end of the topic**. Therefore, though the teacher may need to test certain contents before the end of the topic, it is important that a test is done at the end of each topic. Mid-term, end-term and end year examinations are also encouraged. Some methods of testing are:

- i) Oral for example for brainstorming on a topic, exploring learners knowledge of a new topic or as an indication to the teacher whether the learners are following the lesson.
- ii) Short/written quizzes at the end of the lesson or topic/short answer questions.
- iii) Written assignments/long answer questions/essays
- iv) Practical work - in class or field
- v) Observation - this is used mostly in assessing of psychomotor and affective domain objectives

Observation will therefore include:

- a) Degree of exactness in performance of a task.
- b) Creativity
- c) Timeliness in completing a task and reporting
- d) Enthusiasm /keenness
- e) Care in handling materials and tools
- f) Care of the environment
- g) Co-operation/teamwork spirit

- h) Leadership/planning/organization
/abilities/responsibility
/command/respect

- vi) Practical projects for individuals or groups

It is important for the teacher to understand that **how a task is performed** tells not only the competence gained but also the **attitude** with which it is done

METHODS OF ASSESSMENT

It is recommended that the teacher carries out continuous assessment. Since, the specific objectives state that learners should be able to perform certain task(s) by **the end of the topic**. Therefore, though the teacher may need to test certain contents before the end of the topic, it is important that a test is done at the end of each topic. Mid-term, end-term and end year examinations are also encouraged. Some methods of testing are:

- i) Oral for example for brainstorming on a topic, exploring learners knowledge of a new topic or as an indication to the teacher whether the learners are following the lesson.
- ii) Short/written quizzes at the end of the lesson or topic/short answer questions.
- iii) Written assignments/long answer questions/essays
- iv) Practical work - in class or field
- v) Observation - this is used mostly in assessing of psychomotor and affective domain objectives

Observation will therefore include:

- a) Degree of exactness in performance of a task.
- b) Creativity
- c) Timeliness in completing a task and reporting
- d) Enthusiasm /keenness
- e) Care in handling materials and tools
- f) Care of the environment
- g) Co-operation/teamwork spirit

HOME SCIENCE

INTRODUCTION

Home Science is an applied and integrated science which aims at improving the quality of life for the individual, the family and the community.

This Home Science syllabus incorporates subject areas such as health education, nutrition, textiles, clothing, home care and consumer education. Issues such as HIV/AIDS, STIs, drug misuse, sanitation have been dealt with under health education. Gender responsiveness has also been addressed to encourage both male and female learners to take the subject.

The syllabus has been formatted for uniform interpretation by teachers. In view of this, teachers are advised to use it as a guide and to integrate content areas appropriately during lesson planning. Teachers are called upon to be creative and improvise materials and equipment appropriately. Use of locally available resources and incorporation of the electronic media are encouraged in the enhancement of the learning and teaching of Home Science. Information update in all areas incorporated in this subject is essential.

Emphasis should be laid on economical use of resources through group practicals and, where possible, field visits within the locality. Practical and written assignments should be given regularly so that the teacher can assess the learners' mastery of content and acquisition of relevant skills.

The content has been reorganized and can be covered within the suggested number of lessons, however, flexibility is acceptable. Teachers are advised to make use of the teachers guide in lesson preparation.

It is expected that this syllabus will adequately prepare learners for further education and training in a wide variety of careers.

GENERAL OBJECTIVES

By the end of the course the learner should be able to:

- 1 adapt to environmental, social and economic changes
- 2 practice principles of good health with respect to self, others and the environment
- 3 manage and improvise resources
- 4 practice preventive and promotive health care strategies
- 5 develop artistic values in the selection, preparation and serving of food
- 6 preserve and store foods
- 7 appreciate foods from different communities
- 8 develop artistic values in clothing and interior design
- 9 select, use and care for different fabrics
- 10 develop skills in garment construction and soft furnishings
- 11 acquire knowledge in maternal child health care
- 12 acquire awareness of consumer education and be able to utilize it wisely
- 13 form a foundation for further education and training in various fields.

FORM ONE

<p>1.0.0 INTRODUCTION TO HOME SCIENCE (2 Lessons)</p>	<p>2.2.0 Content</p> <p>2.2.1 Good grooming: - care of the body - ways of enhancing personal appearance</p>	<p>2.2.0 Content</p> <p>2.2.1 Good grooming: - care of the body - ways of enhancing personal appearance</p>
<p>1.1.0 Specific Objectives</p> <p>By the end of the topic the learner should be able to:</p> <ol style="list-style-type: none"> define Home Science explain the importance of Home Science relate Home Science to various career opportunities. 	<p>a) define Home Science</p> <p>b) explain the importance of Home Science</p> <p>c) relate Home Science to various career opportunities.</p>	<p>a) define Home Science</p> <p>b) explain the importance of Home Science</p> <p>c) relate Home Science to various career opportunities.</p>
<p>1.2.0 Content</p> <p>1.2.1 Definition of Home Science</p> <p>1.2.2 Importance of Home Science to:</p> <ul style="list-style-type: none"> - individual - family - nation 	<p>1.2.1 Definition of Home Science</p> <p>1.2.2 Importance of Home Science to:</p> <ul style="list-style-type: none"> - individual - family - nation 	<p>1.2.0 Content</p> <p>1.2.1 Definition of Home Science</p> <p>1.2.2 Importance of Home Science to:</p> <ul style="list-style-type: none"> - individual - family - nation
<p>1.2.3 Home Science as a basis for various careers</p>	<p>1.2.3 Home Science as a basis for various careers</p>	<p>1.2.3 Home Science as a basis for various careers</p>
<p>2.0.0 PERSONAL HYGIENE (11 Lessons)</p>	<p>3.1.0 Specific Objectives</p> <p>By the end of the topic the learner should be able to:</p> <ol style="list-style-type: none"> practice principles of good grooming choose and use cosmetics appropriately state changes in adolescence and relate them to personal hygiene make correct choice, use and care for clothes and shoes. 	<p>2.0.0 PERSONAL HYGIENE (11 Lessons)</p> <p>3.1.0 Specific Objectives</p> <p>By the end of the topic the learner should be able to:</p> <ol style="list-style-type: none"> practice principles of good grooming choose and use cosmetics appropriately state changes in adolescence and relate them to personal hygiene make correct choice, use and care for clothes and shoes.
<p>2.1.0 Specific Objectives</p> <p>By the end of the topic the learner should be able to:</p> <ol style="list-style-type: none"> practice principles of good grooming choose and use cosmetics appropriately state changes in adolescence and relate them to personal hygiene make correct choice, use and care for clothes and shoes. 	<p>3.2.0 Content</p> <p>3.2.1 Common accidents in the home, their causes, prevention and management</p> <ul style="list-style-type: none"> - burns and scalds - cuts and bruises - fractures and sprains 	<p>2.1.0 Specific Objectives</p> <p>By the end of the topic the learner should be able to:</p> <ol style="list-style-type: none"> practice principles of good grooming choose and use cosmetics appropriately state changes in adolescence and relate them to personal hygiene make correct choice, use and care for clothes and shoes. <p>3.2.0 Content</p> <p>3.2.1 Common accidents in the home, their causes, prevention and management</p> <ul style="list-style-type: none"> - burns and scalds - cuts and bruises - fractures and sprains
<p>5.0.0 CARE OF THE HOME (12 Lessons)</p>	<p>4.0.0 HOUSING THE FAMILY(6 Lessons)</p>	<p>4.0.0 HOUSING THE FAMILY(6 Lessons)</p>
<p>5.1.0 Specific Objectives</p> <p>By the end of the topic the learner should be able to:</p> <ol style="list-style-type: none"> classify different types of dirt found in the home choose, use and care for different types of cleaning materials and equipment improvise cleaning materials and equipment practise methods of removing dirt from different surfaces practise cleaning different areas in the home. 	<p>5.2.0 Content</p> <p>5.2.1 Classification of dirt:</p> <ul style="list-style-type: none"> - loose dirt - fixed dirt <p>Choice, use and care of different types of cleaning materials and equipment</p> <p>Improvisation of cleaning materials and equipment</p> <p>Reasons for cleaning a house</p> <p>Removing dirt from surfaces</p>	<p>5.1.0 Specific Objectives</p> <p>By the end of the topic the learner should be able to:</p> <ol style="list-style-type: none"> compare house designs in different communities identify and relate locations of different areas in a house to their functions explain different ways of providing family shelter state and discuss factors to consider when providing family shelter. <p>5.2.0 Content</p> <p>5.2.1 Types of houses</p> <ul style="list-style-type: none"> - traditional houses - modern houses <p>Essential areas and their placement in a house</p> <p>Relationship between locations of different areas in a house and their functions</p> <p>Methods of providing family shelter</p> <p>Factors to consider when providing family shelter.</p>

- d) store perishable and dry food appropriately
e) treat water for drinking
- 6.0.0 KITCHEN EQUIPMENT (8 Lessons)**
- 6.1.0 Specific Objectives**
By the end of the topic the learner should be able to:
 a) identify, use and care for kitchen equipment
 b) exercise safety precautions when handling kitchen equipment
 c) improvise kitchen equipment where necessary.
- 7.2.0 Content**
- 7.2.1 Kitchen and food hygiene
 - 7.2.2 Food spoilage and poisoning
 - 7.2.3 Signs and symptoms of food poisoning
 - 72.4 Storage of perishable and dry foods
 - 7.2.5 Water treatment at home
 - sedimentation
 - filtration
 - boiling
 - storage
- 6.2.0 Content**
Types of kitchen equipment and their use
- 6.2.1**
- 6.2.2 Care of kitchen equipment**
- plastics
 - metals
 - stainless steel
 - aluminium
 - iron
 - enamel
 - wood
 - glass
 - earthenware
 - calabashes
- 6.2.3 Safety precautions when handling kitchen equipment
- 6.2.4 Improvisation of kitchen equipment.
- 7.0.0 FOOD HYGIENE (9 Lessons)**
- 7.1.0 Specific Objectives**
By the end of the topic the learner should be able to:
 a) practice rules of food hygiene
 b) explain the causes and prevention of food spoilage and poisoning
 c) state the signs and symptoms of food poisoning

- 9.0.0 TEXTILE FIBRES (9 Lessons)**
- 9.1.0 Specific Objectives**
By the end of the topic the learner should be able to:
 a) choose, use and care for basic sewing tools and equipment
 b) use and care for a sewing machine.
- 9.2.0 Content**
- 9.2.1 Classification of fibres**
- i) Natural fibres
 - animal (wool, silk)
 - plant (cotton, linen)
 - mineral (asbestos)
 - ii) Man-made fibres
 - regenerated
 - viscose rayon
 - acetate rayon
 - synthetic
 - polyamides (nylon)
 - acrylonitrile (acrylic)
 - polyester (terylene)
 - elastofibres (lycra)
- 11.0.0 STITCHES (12 Lessons)**
- 9.2.0 Content**
- 9.2.1 Classification of fibres**
- i) Natural fibres
 - animal (wool, silk)
 - plant (cotton, linen)
 - mineral (asbestos)
 - ii) Man-made fibres
 - regenerated
 - viscose rayon
 - acetate rayon
 - synthetic
 - polyamides (nylon)
 - acrylonitrile (acrylic)
 - polyester (terylene)
 - elastofibres (lycra)
- 11.1.0 Specific Objectives**
By the end of the topic the learner should be able to:
 a) classify stitches
 b) work out different types of stitches.
- 11.2.0 Content**
- 11.2.1 Classification of stitches
 - temporary
 - permanent (joining, neatening and decorative)
 - 11.2.2 Different types of stitches
 - temporary
 - i) tacking
 - even tacks
 - long and short basting/diagonal tacks
 - tailor tacks
 - permanent
 - joining
 - neatening
 - decorative
- 9.2.2 Properties of common textile fibres**
- cotton
 - linen
 - wool
 - silk
 - viscose rayon
 - nylon
 - acrylic
 - polyester
- 9.2.3 Physical identification of textile fibres.**
- 10.0.0 SEWING TOOLS AND EQUIPMENT (9 Lessons)**
- 10.1.0 Specific Objectives**
By the end of the topic the learner should be able to:

FORM TWO

<p>12.0.0 ENVIRONMENTAL HYGIENE (9 Lessons)</p> <p>12.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) define environmental hygiene b) dispose refuse appropriately c) describe the types of drainage and care for them appropriately d) explain dangers of poor sanitation e) discuss causes, signs, symptoms and prevention of common communicable diseases. 	<p>13.0.0 LAUNDRY EQUIPMENT (3 Lessons)</p> <p>13.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) identify laundry equipment b) choose, use and care for different laundry equipment c) identify laundry processes 	<p>15.0.0 LAUNDRY PROCESSES (1 Lesson)</p> <p>15.1.0 Specific Objective By the end of the topic the learner should be able to identify different laundry processes.</p>	<p>17.0.0 LAUNDERING DIFFERENT FABRICS (9 Lessons)</p> <p>17.1.0 Specific Objective By the end of the topic the learner should be able to launder different fabrics appropriately.</p>
<p>12.2.0 Content</p> <p>12.2.1 Definition of environmental hygiene</p> <p>12.2.2 Disposal of household refuse</p> <ul style="list-style-type: none"> - organic refuse - inorganic refuse - recycling <p>12.2.3 Drainage</p> <ul style="list-style-type: none"> - types of drainage - care <p>12.2.4 Sanitation</p> <ul style="list-style-type: none"> - causes of poor sanitation - dangers of poor sanitation - common communicable diseases <ul style="list-style-type: none"> - typhoid - cholera - dysentery - malaria - bilharzia - scabies - ringworms - T.B. (Tuberculosis) - worm infestation 	<p>13.2.0 Content</p> <p>13.2.1 Types of laundry equipment used for washing, drying, finishing and storage</p> <p>13.2.2 Choice, use and care for different laundry equipment.</p>	<p>14.0.0 DETERGENTS AND LAUNDRY AGENTS (6 Lessons)</p> <p>14.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) distinguish between soap and soapless detergents and their suitability to various fabrics b) explain the difference between hard and soft water c) soften hard water for laundry work d) identify laundry agents. 	<p>16.0.0 REPAIR OF CLOTHES AND HOUSEHOLD ARTICLES (6 Lessons)</p> <p>16.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) discuss the importance of repairing clothes and household articles b) differentiate wear and tear in clothes and household articles c) repair wear and tear in clothes and household articles.
<p>14.2.0 Content</p> <p>14.2.1 Soap and soapless detergents</p> <p>14.2.2 Suitability of different detergents to various fabrics</p> <p>14.2.3 Hard and soft water</p> <p>14.2.4 Soften hard water</p> <p>14.2.5 Other laundry agents</p> <ul style="list-style-type: none"> - bleaches - starch - laundry blue - fabric conditioner - salt 	<p>16.2.0 Content</p> <p>16.2.1 Importance of timely repair of clothes and household articles</p> <p>16.2.2 Wear and tear</p> <p>16.2.3 Repair of clothes and household articles</p> <ul style="list-style-type: none"> - damping (holes, thin areas) - hanging hems - gaping seams - replacement of buttons - buttonhole repairs - repair of belt loops 	<p>18.0.0 SPECIAL TREATMENT IN LAUNDRYWORK (9 Lessons)</p> <p>18.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) identify and remove stains b) carry out special treatment in laundrywork. 	<p>18.2.0 Content</p> <p>18.2.1 Stain Removal</p> <ul style="list-style-type: none"> - blood - tea - grass - oil - ink - banana sap - chewing gum - perspiration - Other Special treatment in laundrywork

- disinfecting
 - fixing colour
 - starching
 - bleuing
 - valeting
 - dry cleaning
 - spotting and sponging
 - fabric conditioning
- 19.0.0 STORAGE OF CLOTHES AND HOUSEHOLD ARTICLES (3 Lessons)**
- 19.1.0 Specific Objectives**
- By the end of the topic the learner should be able to:
- store clothes and household articles;
 - improvise storage facilities for clothes and household articles;
 - improvise storage facilities for clothes and household articles;
 - improvise storage facilities for clothes and household articles.
- 19.2.0 Content**
- 19.2.1 Storage facilities
- 19.2.2 Methods of storing clothes and household articles
- 19.2.3 Improvisation of storage facilities
- 20.0.0 FOOD NUTRIENTS AND NUTRITIONAL DISORDERS (18 Lessons)**
- 20.1.0 Specific Objectives**
- By the end of the topic the learner should be able to:
- classify food nutrients and their sources
 - explain the functions of food nutrients
 - discuss the common nutritional disorders, their signs, symptoms and management
 - discuss causes of malnutrition
 - explain principles of nutrient conservation
- f) state reason for food fortification.

20.2.0 Content	21.2.0 Content
20.2.1 Definitions of food, food nutrient, nutrition, balanced diet and malnutrition	21.2.1 Definition of a scam
20.2.2 Classification of nutrients and their sources	21.2.2 Commonly used seams
20.2.3 Functions of nutrients in the body	<ul style="list-style-type: none"> • inconspicuous - open seam - french seam - overlaid seam - double stitched seams
20.2.4 Causes of malnutrition	21.2.3 Procedures of working commonly used seams
20.2.5 Common nutritional disorders, their signs, symptoms and management	21.2.4 Choice of seams
22.0.0 PATTERNS AND GARMENT CONSTRUCTION (24 Lessons)	22.1.0 Specific Objectives
By the end of the topic the learner should be able to:	By the end of the topic the learner should be able to:
a) store clothes and household articles;	a) take body measurements
b) improvise storage facilities for clothes and household articles.	b) identify pattern symbols and markings and their use
c) fold	c) draft and develop pattern pieces for an apron
d) hang	d) lay out and transfer pattern symbols and markings on to the fabric correctly
e) improvise storage facilities	e) cut out and make the apron.
22.2.0 Content	22.2.0 Content
19.2.1 Storage facilities	22.2.1 Body measurements
19.2.2 Methods of storing clothes and household articles	22.2.2 Pattern symbols and markings
19.2.3 Improvisation of storage facilities	22.2.3 Drafting and developing patterns for an apron
20.1.0 Specific Objectives <p>By the end of the topic the learner should be able to:</p> <ol style="list-style-type: none"> list commonly used seams make samples of commonly used seams choose appropriate seams. 	

23.0.0 CONSUMER AWARENESS (2 Lessons)	23.1.0 Specific Objectives
By the end of the topic the learner should be able to:	By the end of the topic the learner should be able to:
a) explain the importance of consumer education	a) explain the importance of consumer education
b) state sources of consumer information.	b) state sources of consumer information.
23.2.0 Content	23.2.0 Content
23.2.1 Definitions of consumer, consumer education, goods, services	23.2.1 Definitions of consumer, consumer education, goods, services
23.2.2 Importance of consumer education	23.2.2 Importance of consumer education
23.2.3 Sources of consumer information	23.2.3 Sources of consumer information

FORM THREE	
25.0.0 MEAL PLANNING AND MANAGEMENT (24 Lessons)	<p>d) discuss the needs of a pregnant woman e) explain the importance of ante-natal and post-natal care.</p>
25.1.0 Specific Objectives	<p>By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) state the importance of meal planning b) discuss factors to consider when planning meals c) plan and prepare meals to meet individuals needs d) present meals attractively e) plan and prepare packed meals.
25.2.0 Content	<p>Importance of meal planning</p> <p>Factors to consider when planning meals</p> <p>Plan, prepare and present meals for the family and special groups</p> <ul style="list-style-type: none"> · young children · adolescents · manual workers · invalids · convalescents · elderly <p>Packed meals</p>
26.0.0 MATERNAL CHILD HEALTH CARE (12 Lessons)	<p>By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) discuss the importance of safe parenthood b) state the signs of pregnancy c) explain common problems in pregnancy

care of the lactating mother	e) practice proper care of feeding equipment.
growth monitoring and promotion	
	28.2.0 Content
	28.2.1 Care of a lactating mother
	28.2.2 Importance of breastfeeding
	28.2.3 Problems related to breastfeeding and how to overcome them
	Advantages and disadvantages of supplementary /complementary feeding
	Care of feeding equipment handling
	· cleaning
	· storage
	28.2.4 Specific Objectives
	By the end of the topic the learner should be able to:
	a) define immunization
	b) discuss the importance of immunization
	c) explain the immunization schedule.
	27.0.0 CHILD IMMUNIZATION (2 Lessons)
	27.1.0 Specific Objectives
	By the end of the topic the learner should be able to:
	a) define immunization
	b) discuss the importance of immunization
	c) explain the immunization schedule.
	27.2.0 Content
	27.2.1 Definition of immunization
	27.2.2 Importance of immunization
	27.2.3 Immunization schedule for young children
	· BCG
	· diphtheria, whooping cough (pertussis), tetanus, hepatitis B, H. influenza type B
	· polio
	· measles
	· yellow fever
	· supplementation - vitamin A
	29.0.0 WEANING THE BABY (4 Lessons)
	29.1.0 Specific Objectives
	By the end of the topic the learner should be able to:
	a) define weaning;
	b) state factors to consider when weaning a baby
	c) choose and prepare suitable weaning foods
	d) discuss problems related to weaning and their management.
	29.2.0 Content
	29.2.1 Definition of weaning
	29.2.2 Factors to consider when weaning a baby
	29.2.3 Choice and preparation of weaning foods
	29.2.4 Problems related to weaning and how to deal with them
	29.3.0 HABIT TRAINING (6 Lessons)
	28.0.0 BREASTFEEDING (6 Lessons)
	28.1.0 Specific Objectives
	By the end of the topic the learner should be able to:
	a) explain how to care for a lactating mother
	b) explain the importance of breastfeeding
	c) state the problems related to breastfeeding
	d) state advantages and disadvantages of supplementary / complementary feeding
	30.0.0 HABIT TRAINING (6 Lessons)
	30.1.0 Specific Objectives
	By the end of the topic the learner should be able to:
	a) explain the importance of habit training

	b) discuss the role of play in child development c) choose, make and care of play items.	32.0.0 CLOTHING CONSTRUCTION PROCESSES (44 Lessons)	33.2.0 Content 33.2.1 Factors influencing consumer buying 33.2.2 Principles of wise buying 33.2.3 Common methods of buying goods and services
30.2.0 Content 30.2.1 Importance of habit training 30.2.2 Role of play in child development 30.2.3 Choice and care of play items 30.2.4 Making play items	32.1.0 Specific Objectives By the end of the topic the learner should be able to: a) discuss processes in garment construction b) apply the processes in the construction of a garment.	32.2.0 Content 32.2.1 Management of fullness 32.2.2 Pockets <ul style="list-style-type: none">- in-seam pocket- patch pocket 32.2.3 Interfaced waistband 32.2.4 Openings and fastenings <ul style="list-style-type: none">- button and worked buttonholes- hook and eye/bar- zips- concealed- semi-concealed	34.0.0 MAKING A BUDGET (3 Lessons)
31.0.0 FLOUR MIXTURES AND RAISING AGENTS (28 Lessons)	31.1.0 Specific Objectives By the end of the topic the learner should be able to: a) classify different flour mixtures b) explain how raising agents work c) make food items using flour mixtures.	32.2.4 Content 32.2.4 Openings and fastenings <ul style="list-style-type: none">- button and worked buttonholes- hook and eye/bar- zips- concealed- semi-concealed	34.1.0 Specific Objectives By the end of the topic the learner should be able to: a) explain the importance of budgeting; b) make a budget.
	31.2.0 Content 31.2.1 Classification of flour mixtures <ul style="list-style-type: none">- batters- dough 31.2.2 Types and functions of raising agents <ul style="list-style-type: none">- biological- chemical- mechanical	32.2.5 Hem management 32.2.6 Make one of the following: <ul style="list-style-type: none">- skirt- pair of shorts- pair of trousers	34.2.0 Content 34.2.1 Importance of budgeting 34.2.2 Steps in making a budget
	31.2.3 Food items made from different flour mixtures <ul style="list-style-type: none">- pancakes- short crust pastries- cakes<ul style="list-style-type: none">- rubbed in- creamed- bread/doughnuts	33.0.0 PRINCIPLES OF WISE BUYING (3 Lessons)	33.1.0 Specific Objectives By the end of the topic the learner should be able to: a) discuss factors influencing consumer buying b) explain principles of wise buying c) state the advantages and disadvantages of common methods of buying

FORM FOUR

<p>35.0.0 CARE OF THE SICK AT HOME (12 Lessons)</p> <p>35.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) state reasons for taking care of the sick at home b) identify the needs of the sick at home c) discuss preventative measures in the spread of infections. <p>35.2.0 Content</p> <p>35.2.1 Reasons for caring for the sick at home</p> <p>35.2.2 Care for the sick at home</p> <p>35.2.3 Preventative measures in the spread of infections</p> <p>36.0.0 VENTILATION (4 Lessons)</p> <p>36.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) discuss reasons for sufficient ventilation in a room b) identify ways of ventilating a room <p>36.2.0 Content</p> <p>36.2.1 Reasons for adequate ventilation in a room</p> <p>36.2.2 Dangers of poor ventilation</p> <p>36.2.3 Ways of ventilating a room</p> <ul style="list-style-type: none"> - natural - mechanical 	<p>37.0.0 FUELS IN THE HOME (8 Lessons)</p> <p>37.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) identify fuels used in the home b) discuss the advantages and disadvantages of the fuels c) explain the precautions to take while handling fuels in the home d) explain methods of conserving energy. <p>37.2.0 Content</p> <p>37.2.1 Fuels used in the home</p> <ul style="list-style-type: none"> - wood - charcoal - kerosene - gas - electricity - bio-gas - solar - others <p>37.2.2 Advantages and disadvantages of fuels used in the home</p> <p>37.2.3 Precautions to take while handling and storing fuels in the home</p> <p>37.2.4 Methods of conserving energy</p> <p>37.2.5 Ventilating in the Home (8 Lessons)</p> <p>37.2.6 Content</p> <p>37.2.1 Reasons for adequate ventilation in a room</p> <p>37.2.2 Dangers of poor ventilation</p> <p>37.2.3 Ways of ventilating a room</p> <ul style="list-style-type: none"> - natural - mechanical 	<p>38.0.0 LIGHTING IN THE HOME (8 Lessons)</p> <p>38.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) identify sources of light; b) explain methods of lighting a house; c) discuss reasons for appropriate lighting; <p>38.2.0 Content</p> <p>38.2.1 Sources of light</p> <ul style="list-style-type: none"> - natural - artificial <p>38.2.2 Methods of lighting the home</p> <ul style="list-style-type: none"> - direct lighting - semi-direct lighting - indirect lighting - decorative lighting <p>38.2.3 Reasons for appropriate lighting</p> <p>38.2.4 Care of lighting fixtures and lamps</p> <p>39.0.0 SOFT FURNISHINGS IN THE HOME (20 Lessons)</p> <p>39.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) discuss the colour wheel b) discuss factors to consider when choosing soft furnishings for the home c) choose and arrange flowers for different occasions. <p>39.2.0 Content</p> <p>39.2.1 Colour wheel</p> <ul style="list-style-type: none"> - choice of colour - colour scheme <p>39.2.2 Furniture and soft furnishings</p> <ul style="list-style-type: none"> - definitions - reasons for using soft furnishings - choice of soft furnishings <p>39.2.3 Flower arrangement points to consider in flower arrangements</p>	<p>40.0.0 FOOD PRESERVATION (12 Lessons)</p> <p>40.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) explain the reasons for preserving food b) state advantages and disadvantages of food preservation c) discuss methods of preserving food. <p>40.2.0 Content</p> <p>40.2.1 Definition of food preservation</p> <p>40.2.2 Reasons for preserving food</p> <p>40.2.3 Advantages and disadvantages of food preservation</p> <p>40.2.4 Methods of preserving food</p> <ul style="list-style-type: none"> - traditional - modern <p>41.0.0 CONVENIENCE FOODS (2 Lessons)</p> <p>41.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) explain the meaning of convenience foods b) identify convenience foods c) state the advantages and disadvantages of convenience foods <p>41.2.0 Content</p> <p>41.2.1 Meaning of convenience foods</p> <p>41.2.2 Convenient foods</p> <p>41.2.3 Advantages and disadvantages of convenience foods</p> <p>42.0.0 RÉCHAUFFÉ COOKERY (8 Lessons)</p> <p>42.1.0 Specific Objectives By the end of the topic the learner should be able to:</p> <ul style="list-style-type: none"> a) define réchauffé cookery
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- b) state the advantages and disadvantages of using leftover foods
- c) discuss factors to consider when using leftover foods
- d) make réchauffé dishes.
- 42.2.0 Content**
- 42.2.1 Definition of réchauffé cooking
- 42.2.2 Advantages and disadvantages of using leftover foods
- 42.2.3 Storage of leftover foods
- 42.2.4 Factors to consider when using leftover foods
- 42.2.5 Réchauffé dishes
- 43.0.0 CLOTHING CONSTRUCTION PROCESSES (52 Lessons)**
- 43.1.0 Specific Objectives**
- By the end of the topic the learner should be able to:
- discuss selected processes in garment construction
 - apply the processes in garment construction.
- 43.2.0 Content**
- 43.2.1 Processes in garment construction
- collars
 - straight
 - curved
 - cuffs
 - set-in sleeves
 - facings and interfacings
- 43.2.2 Make one of the following
- shirt
 - blouse
- 44.0.0 PROBLEMS OF THE CONSUMER (2 Lessons)**
- 44.1.0 Specific Objective**
- By end of the topic the learner should be able to discuss
- common problems affecting the consumer.
- APPENDIX 1**
- SUGGESTED LEARNING/TEACHING RESOURCES**
- Cooking tools and equipment**
1. Cookers/stoves (choose which ever is suitable)
 - gas
 - electric
 - kerosene
 - charcoal
 - firewood
 - microwave
 2. Food storage equipment
 - cupboards
 - refrigerators
 - saucepans/sufurias/pots (all with covers)
 3. Saucepans/sufurias/pots (all with covers)
 4. Frying pans
 - deep frying pan
 - flat frying pan
 5. Clay pots
 6. Pressure cooker
 7. Knives
 - kitchen knife (french chef knife)
 - vegetable knife
 - bread knife
 - palette knife
 - potato peeler
 - table knives
 8. Spoons
 - tablespoons
 - dessert spoons
 - teaspoons
 - serving spoon
 - ladle
 - wooden spoons (mwiko)
 9. Forks
 - meat fork
 - chefs folk
 - desert fork
 10. Cups
 - plastic
 - tea cups
 - mugs
 11. Glasses - drinking glasses
 12. Fish slice
 13. Flour dredgers
 14. Sieves
 - large

APPENDIX 1

SUGGESTED LEARNING/TEACHING RESOURCES

Cooking tools and equipment	
1. Cookers/stoves (choose which ever is suitable)	
2. Food storage equipment	
3. Saucepans/sufurias/pots (all with covers)	
4. Frying pans	
5. Clay pots	
6. Pressure cooker	
7. Knives	
8. Spoons	
9. Forks	
10. Cups	
11. Glasses - drinking glasses	
12. Fish slice	
13. Flour dredgers	
14. Sieves	
15. Tailors chalk	
16. French curve *	

* Not compulsory

Sewing Notions

1. Machine sewing threads	
2. Tacking thread	
3. Materials for coursework and samples	
4. Trimmings – ribbons, lace, embroidery threads (depending on coursework articles)	
5. Fasteners	
6. Glasses - drinking glasses	
7. Fish slice	
8. Flour dredgers	
9. Sieves	
10. Large	

- small
- 15. Mixing bowls
- 16. Chopping boards
- 17. Plates
 - kitchen - plastic, enamel table
 - platters
 - measuring jug
 - measuring spoons
 - measuring cups
 - weighing scale
- 18. Measuring/equipment
 - kitchen - plastic, enamel table
 - measuring jug
 - measuring spoons
 - measuring cups
 - weighing scale
- 19. Rolling pins
- 20. Casserole dishes *
- 21. Serving dishes
- 22. Graters
- 23. Kettles
- 24. Kitchen scissors *
- 25. Mortar and pestle *
- 26. Salt shakers
- 27. Water jug
- 28. Trays
- 29. Whisks
 - hand
 - rotary
- 30. Potato mashers
- 31. Skewers *
- 32. Roasting dish
- 33. Dustbin with cover
- 34. Labour saving, equipment *
 - meat mincer
 - food processors
 - blenders
 - juicers
 - extractors
 - deep fryers
 - rice cookers
 - shredders
 - sandwich makers

* Not compulsory

APPENDIX II

SUGGESTED ASSESSMENT METHODS

- 1. Practical work
- 2. Project work
- 3. Field trips
- 4. Oral questions
- 5. Quizzes
- 6. Written tests and examinations
- 7. Group reports

Water heater

- 3. Basins
- 5. Dustpan
- 4. Buckets
- 6. Brooms

- yard broom
- soft broom
- carpet brush *

- 7. Brushes
 - clothes brush
 - scrubbing brush
 - shoe brushes
 - cobweb brush
 - bottle brush *

- 8. Rubber squeezers *
- 9. Floor mops, rags or cloths

- 10. Dusters
- 11. Clothes line
- 12. Pegs
- 13. Hangers
- 14. Irons
- 15. Ironing surfaces
- 16. Soap dishes
- 17. Garbage bin with cover (large)

* Not compulsory

- Cleaning and Laundry Equipment**
1. Water storage equipment