

**THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION AND VOCATIONAL TRAINING**



**BIOLOGY SYLLABUS FOR SECONDARY EDUCATION
FORM I - IV**

2005

© Ministry of Education and Vocational Training, 2005 First reprint 2010
Second reprint 2012

ISBN 9978 - 9976 - 61 - 303 - 2

Design and prepared by: Tanzania Institute of Education,
P.O. Box 35094, Dar es Salaam,
TANZANIA.
Tel. 022-27730035/2774420/2780891 Fax No. +255-51-2774420
E-mail: director.general@tie.go.tz

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1.0 Introduction

This Biology syllabus is a revised version which has been prepared to replace that of 1996. The revision process has been focused on change in paradigm from that of content based curriculum to a competence based curriculum. Moreover, the revision was inevitable due to the fact that the 1996 syllabus did not sufficiently consider the current social, cultural, global, technological, subject biases and cross cutting issues taking place world wide but particularly in Tanzanian society.

In addition, the revision has also taken into consideration the requirements for the Secondary Education Development Plan (SEDP). This syllabus has been introduced for implementation January 2007.

2.0 Aims and Objectives of Education in Tanzania

The general aims and objectives of education in Tanzania are to:

- a) guide and promote the development and improvement of the personalities of the citizens of Tanzania, their human resources and effective utilization of those resources to bringing about individual and national development;
- b) promote the acquisition and appreciation of the culture, customs and traditions of the people of Tanzania;
- c) promote the acquisition and appropriate use of literacy, social, scientific, vocational, technological, professional and other forms of knowledge, skills and attitudes for the development and improvement of the condition of man and society;
- d) develop and promote self-confidence and an inquiring mind, an understanding and respect for human dignity and human rights and readiness to work hard for self advancement and national development;
- e) promote and expand the scope of acquisition, improvement and upgrading of mental, practical, productive and other skills needed to meet the changing needs of industry and the economy;
- f) enable every citizen to understand and uphold the fundamentals of the National Constitution as well as the enshrined human and civic rights, obligations and responsibilities;
- g) promote love for work, self and wage employment and improved performance in the production and service sectors;
- h) inculcate principles of national ethic and integrity, national and international cooperation, peace and justice through the study, understanding and adherence to provision of the national constitution and other international basic charters;
- i) enable rational use, management and conservation of the environment.

3.0 Aims and Objectives of Secondary Education

The aims and objectives of secondary education are to:

- a) consolidate and broaden the scope of baseline ideas, knowledge, skills and attitudes, acquired and developed at the primary education level;
- b) enhance the development and appreciation of national unity, identity and ethic; personal integrity, respect for human rights, cultural and moral values, customs, traditions and civic responsibilities and obligations;
- c) promote the development of competency in linguistic ability and effective use of communication skills in Kiswahili and at least one foreign language;
- d) provide opportunities for the acquisition of knowledge, skills, attitudes and understanding in prescribed or selected fields of study;
- e) prepare students for tertiary and higher education, vocational, technical and professional training;
- f) inculcate a sense and ability for self-study, self-confidence and self-advancement in new frontiers of science and technology, academic and occupational knowledge and skills.
- g) Prepare the students to join the world of work.

4.0 General Subject Competences

By the end of four year course, the student should have ability to:

- a) make appropriate use of biological knowledge, concepts, skills and principles in solving various problems in daily life;
- b) record, analyze and interpret data from scientific investigation using appropriate methods and technology to generate relevant information in biological science;
- c) demonstrate knowledge and skills in combating health related problems such as HIV/AIDS, drug and drug abuse, sexual and reproductive health;
- d) access relevant information on biological science and related fields for self study and life-long learning.

5.0 General Subject Objectives

By the end of this four years course, the student should be able to:

- a) evaluate the role, influence and importance of biological science in every day life;
- b) develop the capacity to improve and maintain their own health, of families and the community;
- c) develop mastery of fundamental concepts, principles and skills of biological science and related fields such as agriculture, medicine, pharmacy and veterinary;
- d) develop necessary biological practical skills;
- e) apply scientific skills and procedures in interpreting various biological data;
- f) acquire basic knowledge and apply appropriate skills in combating problems related to HIV, AIDS, STIs, gender, population, environment, drugs/substance abuse, sexual and reproductive health;
- g) develop the ability and desire for self study, self confidence and self advancement in biological sciences and related fields.

6.0 The Structure and Organization of the Syllabus

This Biology syllabus has a slightly different structure and organization compared to that of 1996. The current syllabus content has been organized into seven (7) columns instead of four (4). The columns consist of the Topic, Sub-topic, Specific Objectives, Teaching and Learning resources, Assessment and the Number of Periods. This content is preceded by class competences and class level objectives for each Form.

6.1 Class Level Competences

Competences have been stated for each class level of Biology course. Competences are skills, knowledge and attitudes attained by the learner after learning process.

6.2 Class Level Objectives

Class level objectives have been derived from class level competences. They are stated in general terms to indicate scope of content to be covered within each level.

6.3 Topics

The topics have been derived from the class level competences and objectives. Topics have been arranged to attain logical order starting from the simple to complex. Both block and spiral arrangements of topics have been adopted.

6.4 Sub-topics

Every main topic in the syllabus is divided into several sub-topics. The sub-topics are organized sequentially and presented based on conceptual development of the learners.

6.5 Specific Objectives

There are specific objectives suggested for every subtopic in the syllabus. These are benchmarks upon which the teacher targets to tailor his/her instructional to enable learners to meet the prescribed knowledge, skills and spelt out in each objective. The specific objectives are instructional objectives that the teacher should use to operationalize the teaching and learning process for the respective topics in the syllabus. The specific objectives also provide basis for assessment of learners' achievement.

6.6 Teaching and Learning Strategies

These are activities of the teacher and learners during the teaching and learning process of a particular subtopic. The teaching and learning strategies are focused to ensure achievement of the respective specific objectives under each subtopic.

6.7 Teaching and Learning Materials

Teaching and learning resources include non-consumable teaching aids and materials as well as consumable materials. The teaching and learning resources are those which are to be used during the teaching and learning process for each respective subtopic. Teachers can improvise teaching and learning resources other than those suggested in the syllabus where need arises.

6.8 Assessment

An assessment shows what and how to assess students with regard to the required knowledge, skills and attitudes to be developed for each specific objectives and respective set of teaching/learning strategies.

6.9 Number of Periods

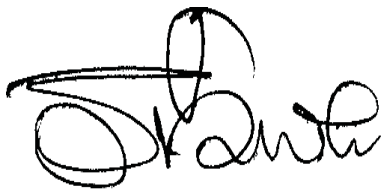
Number of periods is an estimated time to be used to teach a given topic/sub- topic. Each period is 40 minutes.

The numbers of periods have been taken into account the time needed to adequately cover the sub-topic. Some topics need more time than others depending on the nature and weight of the topic. The teacher is advised to make maximum use of time allocated in classroom in struction. Lost instructional time should always be compensated for.

DECLARATION

Ordinary level secondary education is a four years course which has been designed to prepare students for the advanced level or other tertiary education. A student will be recognized as a form four graduate when he/she successfully completes and pass secondary education examinations conducted by National Examination Council of Tanzania.

This document is hereby declared as the *Syllabus of Biology* for ordinary level secondary education course.



M. M. Wassewa

Commissioner for Education

Ministry of Education and Vocational Training

FORM ONE

CLASS LEVEL COMPETENCES

Student should have the ability to:

1. Make the use of scientific procedures and practical skills in studying biology.
2. Demonstrate appropriate use of biological knowledge, concepts, principles and skills in every day life.
3. Group organisms according to their similarities and differences.
4. Demonstrate appropriate preventive measures and precautions against common accidents, infections and other related health problems.

CLASS LEVEL OBJECTIVES

By the end of Form One course, the student should be able to:

- a) Develop basic knowledge and skills on scientific processes of studying biology.
- b) Develop mastery for carrying out experiments on various biological processes.
- c) Develop appropriate use of biology knowledge, concepts, principles and skills in every day life.
- d) Promote ability to communicate using biological terms and vocabularies.
- e) Classify living organisms in their respective kingdoms and phyla/divisions.
- f) Apply appropriate health precautions and measures against common accidents, infections and other health problems as well as protecting others.

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
1. 0 INTRODUCTION TO BIOLOGY 1.1 Basic Concepts and Terminologies of Biology.	The student should be able to: a) explain the meaning of Basic biological concepts and terminologies.	i) Students in groups to discuss the basic biological concepts and terminologies such as life, cell, living things/ organisms. ii) The teacher to use students' responses to make clarification on basic biological concepts and terminologies.	<ul style="list-style-type: none"> • Texts extracted from various sources on basic biological concepts and terminologies. A variety of living and non-living things. • Preserved organisms. 	Is the student able to explain the meaning of the basic biological concepts and terminologies?	6
	b) outline the characteristics of living things.	i) Students in groups to discuss the characteristics of living things. ii) The teacher to guide students to summarize their responses and make conclusion.	<ul style="list-style-type: none"> • Chart/Diagrams showing the characteristics of living things. • Variety of living things. 	Is the student able to outline the characteristics of living things?	
	c) explain the importance of studying biology.	i) The teacher to lead students to brainstorm using Visualization in Participatory Programme cards (VIPP) on the importance of life, living things and studying biology. ii) Students in groups to discuss the importance of studying biology.	<ul style="list-style-type: none"> • VIPP cards. • Pictures. • Variety of living organisms. 	Is the student able to explain the importance of studying Biology?	14

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	d) relate biological science with other related fields.	The teacher to guide students to discuss in groups the relationship between biology and other science fields such as agriculture, medicine, veterinary science, nutrition, forestry and pharmacy.	<ul style="list-style-type: none"> • Magazines • Journals • Biological science and related fields 	Is the student able to relate biological science with other related fields?	
1.2 Scientific Processes in Biology.	<p>The student should be able to:</p> <p>a) use own sense organs to make correct observations.</p> <p>b) take measurements of mass, length, temperature and pulse rate.</p>	<p>i) The teacher to assign simple activities that will lead the students to use sense organs to observe different conditions/situations in the surroundings.</p> <p>ii) Students to carry out simple activities and use their sense organs to make correct observations of different conditions/situation in the surroundings.</p>	Variety of living and non-living materials e.g. hot water, ice, colourful pictures, perfume, bell/whistle, plants, animal, stone wood, preserved specimen.	Is the student able to use sense organs to make correct observations?	10
		i) The teacher to provide guidelines, materials, apparatus and equipment for measuring mass, length, temperature and pulse rate.	<ul style="list-style-type: none"> • Tapes. • Thermometers. • Weighing Scales. • Stop watch. • Rulers. • Various objects such as boxes, stone, flour, sugar, water • Real objects. 	Is the student able to carry out practical exercises to measure mass, length temperature and pulse rate?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students in pairs to take measurements of different substances, record their findings and present in class for discussion.</p>	<p>ii) The teacher to guide students to carrying out simple biological experiments such as observing specimen using hand lens, investigating habitats of different organisms, observation of various types of leaves.</p> <p>ii) Students in groups using guidelines to carry out simple biological experiments, record, analyse and accurately present their findings.</p>	<ul style="list-style-type: none"> • Specimens. • Apparatus. • Equipment. • Practical Manuals. • Organisms. • Soil. 	<p>Is the student able to carry out simple biological experiments?</p>	
3.1 The Biology Laboratory.	<p>The student should be able to:-</p> <p>a) describe the Biology Laboratory.</p>	<p>i) The teacher to lead students to describe the biology laboratory and laboratory rules.</p> <p>ii) Students to make familiarization tour in a biology laboratory to observe its common features and discuss laboratory rules.</p>	<ul style="list-style-type: none"> • A variety of biology laboratory tools. • List of laboratory rules. 	<p>Is the student able to describe the common features of the Biology Laboratory.</p>	8

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) identify common apparatus and equipment of Biology laboratory.	i) The teacher to assist students to identify and name common apparatus and equipments of biology laboratory such as microscope, glass ware, dissecting kit, Bunsen burner, thermometer. ii) The teacher to lead a class discussion on the structure and use of the microscope. iii) Students to demonstrate the use of microscope.	<ul style="list-style-type: none"> • A variety of biology laboratory apparatus and equipment. • Microscope. • Microscope slides. • Tools or equipments collected by the students. 	Is the student able to identify common apparatus and equipment of biology laboratory?	
	c) interpret warning signs on containers of laboratory chemicals and apparatus.	i) Students in groups to observe and discuss the laboratory chemicals and apparatus warning signs. ii) The teacher to use students' responses to make clarification and conclusion.	<ul style="list-style-type: none"> • Wall charts and pictures showing warning signs. • Containers collected by the teacher and students. 	Is the student able to interpret correctly warning signs on containers of laboratory chemicals and apparatus?	
	d) distinguish the biology laboratory from other school facilities.	i) The teacher to organize a study visits to other school facilities e.g. library, chemistry and physics laboratories, classroom, and stores.	<ul style="list-style-type: none"> • Laboratories. • Library. • Classrooms. • Any other school facilities. 	Is the student able to differentiate biology laboratory from other school facilities?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
<p>2.0 SAFETY IN OUR ENVIRONMENT 2.1 First Aid.</p>	<p>The student should be able to:</p> <p>a) explain the meaning and importance of First Aid at home and at school.</p>	<p>ii) Students in groups to discuss the differences between biology laboratory and other facilities in the school (e.g. library, Chemistry and Physics laboratories, classrooms stores.</p> <p>i) Students in groups to brainstorm on the meaning and importance of First Aid at home and school.</p> <p>ii) The teacher to lead class discussion and make clarification on the meaning and importance of First Aid at home and school.</p>	<p>Publications on First Aid.</p>	<p>Is the student able to explain the meaning and importance of First Aid Kit at home and at school?</p>	<p>8</p>
	<p>b) identify components of the First Aid Kit and their uses.</p>	<p>i) Students to observe and identify components of first Aid Kit.</p> <p>ii) The teacher to lead a class discussion on the components of First Aid kit and their uses.</p>	<ul style="list-style-type: none"> • First Aid Kit. • Charts showing components of First Aid Kit and their uses. 	<p>Is the student able to identify components of the First Aid Kit and their uses?</p>	
	<p>c) outline procedures of rendering First Aid to various victims.</p>	<p>i) Students to brainstorm on ways of rendering first aid to various victims.</p>	<ul style="list-style-type: none"> • First Aid Kit. • Charts on First Aid. • Components of First Aid Kit. • Stretcher. 	<p>Is the student able to outline proper procedure of giving First Aid to various victims?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) The teacher to provide guidelines on “Procedures of rendering First Aid to various victims”, Risks and Safety Precautions.</p> <p>iii) Students to carry out a guided practice of rendering first aid to victims of insect bite, bruises, snakebite, muscle cramps, vomiting, bleeding, and electric shock.</p>	<p>ii) The teacher to provide guidelines on “Procedures of rendering First Aid to various victims”, Risks and Safety Precautions.</p> <p>iii) Students to carry out a guided practice of rendering first aid to victims of insect bite, bruises, snakebite, muscle cramps, vomiting, bleeding, and electric shock.</p>	<ul style="list-style-type: none"> • Blanket. • Wheel chair. • Other relevant materials. 		
2.2 Safety at Home and School.	<p>d) render first aid services to various victims.</p> <p>a) mention common accidents at home and school.</p>	<p>i) Students in groups to practice procedures of rendering First Aid to various victims such as victims of bruises, snakebite, insect bites, electric shock, bleeding, vomiting, muscle cramps, hiccups and poisoning.</p> <p>ii) The teacher to and make appropriate clarifications and corrections.</p>	<ul style="list-style-type: none"> • First Aid Kit. • Clear Water. • Soap. • Blanket. • Sand. • Other relevant materials. 	<p>Is the student able to demonstrate different ways of giving First Aid to various victims?</p>	6
		<p>i) The teacher to lead a class discussion on common accidents at home and school.</p>	<ul style="list-style-type: none"> • Variety of things that can cause accident at home and school. • Knife. • Kerosene. 	<p>Is the student able to mention common accidents at home and school</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	ii) The students to give examples of common accidents at home and school.	• Fire. • Medicine.			
	b) outline ways of preventing accidents at home and school.	i) The teacher to lead students to brainstorm ways of preventing accidents at home and school. ii) The teacher to collect proper responses from the students and make clarification.	• Variety of things that causes accident at home and school. • Kerosene. • Fire. • Medicine.	Is the student able to outline proper ways of preventing accidents at home and school?	
	c) explain ways of maintaining safety at home and school.	i) Students to brainstorm on ways of maintaining peace and safety at home. ii) The teacher to use students' responses to give clarification on ways of maintaining peace and safety at home and school.	• Kerosene. • Fire. • Medicine.	Is the student able to explain ways of maintaining peace and safety at home and school?	
2.3. Waste Disposal.	The student should be able to: a) explain the terms 'waste' and 'waste disposal.	i) Students to brainstorm on the meaning of waste and waste disposal. ii) The teacher to use students' responses to make clarification and conclusion.	• Samples of waste (paper, plastics, glass, vegetation). • Pictures/photographs of dumped waste.	Is the student able to explain the meaning of waste and waste disposal?	8

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) identify types of waste.	i) The teacher to arrange a study tour to a nearby dumping site for students to observe different types of waste. ii) Students to classify waste according to their physical state. iii) The Teacher to assign group work to students of classifying waste produced at home, school and industry according to the living and non- living components.	<ul style="list-style-type: none"> • Liquid waste. • Solid waste. • Plastics and non- plastic waste. • Pictures/diagram showing variety of wastes. • Dumping sites. • Dust bin. • Sewage system. 	Is the student able to identify different types of waste?	
	c) outline basic principles of waste disposal.	i) Students in groups to discuss the basic principles of waste disposal. ii) The teacher to lead class discussion on basic principles of waste disposal according to local authority regulations.	<ul style="list-style-type: none"> • Textbooks. • Local Authority. • Health regulations. • Publications on Waste Management. • Assorted Waste. 	Is the student able to outline basic principle of waste disposal?	
	d) demonstrate proper ways of disposing waste.	i) The teacher to guide practical session of classifying waste into recycled and non-recycled.	<ul style="list-style-type: none"> • Assorted waste into recycled and non-recycled. • Waste bins. • Shovels and holes. 	Is the student able to demonstrate proper ways of disposing waste?	10

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students to demonstrate proper ways of disposing waste.</p> <p>i) The teacher to present a case study of uncontrolled waste disposal in a locality.</p> <p>ii) Students in small groups to brainstorm on effects of poor waste disposal.</p> <p>iii) The teacher to lead students to discuss in a plenary session the effects of poor waste disposal and the importance of disposing waste properly.</p>	<p>ii) Students to demonstrate proper ways of disposing waste.</p> <p>i) The teacher to present a case study of uncontrolled waste disposal in a locality.</p> <p>ii) Students in small groups to brainstorm on effects of poor waste disposal.</p> <p>iii) The teacher to lead students to discuss in a plenary session the effects of poor waste disposal and the importance of disposing waste properly.</p>	<ul style="list-style-type: none"> • Gloves and other protective gears. • Water and soap. • Text on case study. • Publications on waste disposal. • Any relevant materials. 	<p>Is the student able to explain the effects of poor waste disposal at home and school?</p>	
<p>3.0 HEALTH AND IMMUNITY</p> <p>3.1 The Concept of Health and Immunity.</p>	<p>The student should be able to:</p> <p>a) explain the concepts of Health and Immunity.</p>	<p>The teacher to guide students to make a simple survey on how waste is disposed in their community.</p> <p>i) Students to brainstorm on the concepts of health and immunity.</p> <p>ii) The teacher to organize students' responses and use them to lead a discussion on the meaning of health and immunity.</p>	<ul style="list-style-type: none"> • Dust bin. • Dumping sites. <p>Charts/pictures/ Photographs showing people with good health.</p>	<p>Is the student able to suggest proper ways of disposing waste?</p> <p>Is the student able to explain the concepts of “health” and “immunity”?</p>	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) mention types of body immunity and their importance. c) state factors which affects body immunity.	i) Using questions and answers, the teacher to explore what students know about body immunity. ii) The teacher to lead class discussion on types of body immunity (natural and induced) and their importance.	<ul style="list-style-type: none"> • Text extract on body immunity. • Samples vaccines. 	Is the student able to mention types of body immunity and their importance?	
3.2 Personal Hygiene and Good Manners.	The student should be able to:- a) explain concepts of 'Personal Hygiene' and 'Good Manners'.	i) Students to brainstorm on factors which affect body immunity. ii) The teacher to use student responses to make necessary clarifications and conclusion.	<ul style="list-style-type: none"> • Charts on health and body immunity. • Samples of vaccines. 	Is the student able to state factors affecting body immunity?	
3.2 Personal Hygiene and Good Manners.	b) explain the importance of personal hygiene and good manners.	i) Students in groups to discuss the meaning of personal hygiene and good manners. ii) The teacher to make clarifications and conclusion basing on students responses.	Pictures showing people with characteristics of good manners.	Is the student able to explain the concepts of personal hygiene and good manners?	6
		i) The teacher to lead a discussion on the characteristic features of good manners.	<ul style="list-style-type: none"> • Wall pictures and charts depicting people with characteristics of good manners. • Films. 	Is the student able to explain the importance of personal hygiene and good manners?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) Students in groups to discuss the importance of good manners.	<ul style="list-style-type: none"> Educational slides. 		
	c) outline principles of personal hygiene and good manners.	i) The teacher to lead a class discussion on the principles of personal hygiene. ii) Students to outline principles of personal hygiene and good manners.	Chart on principles of personal hygiene and good manners.	Is the student able to outline principles of personal hygiene?	
	d) mention requirements of personal hygiene and good manners.	i) Students to brainstorm on the way of taking care of the body and clothes. ii) Students to demonstrate on ways of taking care of the body and clothes.	<ul style="list-style-type: none"> Pictures/charts showing towel, soap, comb, brush, tooth brush, basin. Pictures/charts showing the characteristics of good manners. 	Is the student able to mention requirements of personal hygiene and good manners?	
	e) outline ways of maintaining proper personal hygiene during puberty.	i) Students in groups to discuss proper ways of maintaining personal hygiene during puberty. ii) The teacher to make clarification and conclusion on healthy and life styles by focusing on drugs, diet, sexual behaviour, soaps and cosmetics.	<ul style="list-style-type: none"> Posters Film and pictures showing effects of drugs on users. Samples of cosmetics and soap. 	Is the student able to outline ways of maintaining proper personal hygiene during puberty?	6

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
3.3 Infections and Diseases.	<p>The student should be able to:</p> <p>a) explain the meaning of ‘infection’ and ‘disease’.</p>	<p>i) Students in groups to discuss the meaning of infection and disease.</p> <p>ii) The teacher to lead plenary discussion on the meaning of infection and disease and their differences.</p>	<ul style="list-style-type: none"> • Texts on case studies on infections and diseases. • Charts/Pictures of people suffering from common infections and diseases. 	<p>Is the student able to explain the meaning of “Infection” and “Disease”?</p>	6
	<p>b) mention common infections and diseases.</p>	<p>i) Students to brainstorm on the common infections and diseases (Communicable, non-communicable, epidemic, endemic and pandemic diseases).</p> <p>ii) Teacher to summarize and make conclusions by giving examples such as:</p> <ul style="list-style-type: none"> • Epidemic diseases e.g cholera, meningitis, tuberculosis and plague. • Endemic diseases e.g bilharzias, malaria, gonorrhoea and syphilis. • Pandemic diseases e.g. HIV and AIDS. 	<p>Charts and pictures on common infections and diseases.</p>	<p>Is the student able to mention common infections and disease?</p>	
	<p>c) explain the causes, symptoms, mode of transmission and effects of common infections and diseases.</p>	<p>i) The teacher to guide students to investigate the common infections and diseases in their community.</p>	<ul style="list-style-type: none"> • Charts on common infections and diseases. 	<p>Is the student able to investigate causes,</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) Students to visit local health facility to investigate the causes, symptoms and effects of common infections and diseases. iii) Students using guiding questions to analyse their findings and share their work in a plenary session and the teacher to make clarification and conclusion.	<ul style="list-style-type: none"> • Pictures showing people with common infections/diseases. • Video/radio tapes on causes, symptoms, modes of transmission, and effect of common infections and diseases. 	symptoms, mode of transmission and effects of common infections and diseases?	
	d) suggest appropriate preventive and control measures for common infections and diseases.	i) Students using guidelines to carry out a survey on the common diseases in the community and write reports. ii) The teacher to guide students to present their reports in the plenary and guide them to summarize and make conclusions on appropriate measures to be taken to control the spread of common epidemic, pandemic and endemic diseases.	<ul style="list-style-type: none"> • Charts. • Journal articles on common epidemic, pandemic and endemic diseases. 	Is the student able to suggest appropriate preventive and control measures for common infections and diseases?	
3.4 Human Immune Deficiency virus (HIV),	The student should be able to: a) explain the meaning of HIV, AIDS, STIs and STDs.	i) The teacher to guide students in groups to discuss the meaning of HIV, AIDS, STIs, and STDs.	<ul style="list-style-type: none"> • Pamphlets. • Brochures. • Charts/texts on HIV, AIDS/STIs. 	Is the student able to explain the meaning of “HIV, AIDS”, “STIs” and “STDs”?	6

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
Acquired Immune Deficiency Syndrome (AIDS), Sexually Transmitted Infections (STIs) and sexually Transmitted Diseases (STDs).		ii) The teacher to guide students to present group tasks for plenary discussion and guide them in making necessary corrections.			
	b) explain causes, symptoms, mode and transmission and effects of HIV, AIDS, STIs and STDs.	i) Students to brainstorm on causes, symptoms, ways of transmission and effects of HIV, AIDS, STDs and STIs. ii) The teacher to invite a guest speaker to talk on causes, symptoms, mode of transmission, effects, preventive and control measures of STIs and HIV, AIDS. iii) The teacher to guide students to summarize the major points from the guest speaker's speech/presentation.	<ul style="list-style-type: none"> • Pictures. • Charts. • Brochures and Fliers. 	Is the student able to explain the causes, symptoms, mode of transmission and effects of STIs, HIV and AIDS?	
	c) outline the preventive and control measures of HIV, AIDS, STIs and STDs.	i) By using questions and answers, the teacher to guide students to outline the preventive and control measures of HIV/AIDS, STIs and STDs. ii) Students to summarise major points and the teacher to guide them to make clarification and conclusion.	<ul style="list-style-type: none"> • Charts. • Magazines. • Journal/articles on STIs, HIV and AIDSs. • Radio/Video tapes • Films. 	Is the student able to outline preventive and control measures of STIs, HIV and AIDS?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
3.5 Management of STIs, HIV and AIDS.	The student should be able to: a) explain ways of avoiding risky situations, risky behaviours and practices.	i) The teacher to guide students to discuss in groups ways of avoiding risky situations, behaviours and practices. ii) Students to present group deliberations in plenary.	<ul style="list-style-type: none"> • Magazines. • Brochures/fliers on ways of avoiding risk behaviours and practices. 	Is the student able to explain ways of avoiding risky situations, risky behaviours and practices?	6
	c) demonstrate necessary skills for avoiding risky behaviours, practices and situations.	i) Students using guidelines to role-play on how to use various life skills to avoid risky situation, behaviours and practices. ii) The teacher to guide students to discuss the major effects and consequences shown in the role-play and make conclusions.	<ul style="list-style-type: none"> • Pamphlets. • Charts/pictures showing risky behaviours, practices and situations. 	Is the student able to demonstrate necessary skills for avoiding risky behaviours, practices and situations?	
	c) explain the importance of curative health care for STIs and opportunistic diseases.	i) The teacher to lead students to brainstorm the importance of curative health care for STIs and opportunistic diseases e.g. early health care seeking habit, the importance of early medical testing and treatment.	<ul style="list-style-type: none"> • Pamphlets. • Brochures. • Radio/Video tapes. • Pictures showing health care for STIs and opportunistic diseases. 	Is the student able to explain the importance of curative health care for STIs and opportunistic diseases?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
3.6 Care and Support for People Living with HIV and AIDS (PLWHA).	The student should be able to: a) explain the importance of providing care and support to PLWHA in the family community and at school.	ii) The teacher to invite a health officer to talk on necessary curative health cares and services for STIs and opportunistic diseases. iii) The teacher to guide students to summarize the major ideas from the above presentation.			
	The student should be able to: a) explain the importance of providing care and support to PLWHA in the family community and at school.	i) The teacher to lead students through questions and answers to explain the importance of providing care and support to PLWHA in the family, community and school. ii) The teacher to guide students to summarize the major ideas and points on the importance of providing care and support to PLWHA.	<ul style="list-style-type: none"> • Publications on home based care for PLWHA. • Any other relevant materials. • Pictures showing how to take care PLWHA. 	Is the student able to explain the importance of providing care and support to PLWHA in the family community and at school?	6
	b) outline necessary care and support services to be provided to PLWHA in the family, community and at school.	i) The teacher to guide students to discuss in groups the necessary care and support services to be provided to PLWHA in the family and at school.	<ul style="list-style-type: none"> • Manuals on care and support for PLWHA. • Film/Video tapes on care and support services to PLWHA. 	Is the student able to outline necessary care and support services to be given to PLWHA?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students to present their responses for plenary.</p> <p>iii) The teacher to guide student to make corrections and clarification.</p>	<p>i) The teacher to provide case studies on the various incidences of stigma and discrimination and their effects to an individual, family and society.</p> <p>ii) Students in groups to discuss the case studies, make correct interpretations and present their responses for plenary discussion.</p>	<ul style="list-style-type: none"> Pamphlets/Brochures on stigmatization and discrimination of PLWHA. Pictures/photographs on incidences of discrimination and stigma to PLWHA. 		
<p>4.0 CELL STRUCTURE AND ORGANISATION</p> <p>4.1 The Concept of Cell.</p>	<p>The student should be able to:</p> <p>a) explain the meaning of the cell.</p> <p>b) mention the characteristics of the cell.</p>	<p>i) The teacher to lead students to discuss in groups the meaning of cell.</p> <p>ii) Students to present their responses for plenary discussion.</p> <p>i) Students in groups to discuss the characteristics of the cell.</p> <p>ii) The teacher to lead a class discussion on the characteristics of the cell.</p>	<p>Charts/models showing different types of cells.</p> <ul style="list-style-type: none"> Charts/models of different types of cells. Prepared slides on different types of cells. 	<p>Is the student able to explain the effects of discrimination and stigma to PLWHA?</p> <p>Is the student able to explain the meaning of the cell?</p> <p>Is the student able to mention characteristics of the cell?</p>	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) differentiate various types of cells.	i) The teacher to design practical work for students to observe different types of cells. ii) Students in groups to observe and differentiate various types of cells, prepared microscope slides, charts and modes of different cell types. iii) The teacher to lead class discussion on various cell types.	<ul style="list-style-type: none"> • Charts/models/ pictures of different types of cells. • Prepared microscope slides showing different types of cells. • Microscope. • Stains. • Scalpels. 	Is the student able to differentiate various types of cells?	
4.2 Plant and animal cells.	The student should be able to: a) explain the functions of different parts of plant and animal cells. b) draw and label plant and animal cell.	i) Using guiding questions students in groups to observe charts/ models/ slides of plant and animal cells. ii) The teacher to lead a class discussion on functions of different parts of a plant and animal cell.	<ul style="list-style-type: none"> • Microscope. • Microscope slides. • Stains. • Scalpels. • Charts/ Diagrams Models/Pictures/ Micrographs. 	Is the student able to explain the functions of different parts of plant and animal cells?	4
		i) The teacher to guide students on how to prepare slides, charts and models of plant and animal cells. ii) Students to draw and label plant and an animal cell.	Charts/micrographs/ microscope slides of plant and animal cells.	Is the student able to draw well labelled diagrams of plant and animal cells?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) outline similarities and differences of plant and animal cells.	Students in groups to observe and discuss displayed charts, models, slides and pictures of plant and animal cell.	Microscope slides/charts showing plant and animal cells.	Is the student able to outline similarities and differences of plant and animal cells?	
4.3 Cell Differentiation.	The student should be able to: a) explain the concept of cell differentiation.	i) The teacher to display fresh/ preserved specimen/charts/ models of plant and animal tissues and organs. ii) Students in groups to observe the displayed tissues and organs of plants and animals. iii) The teacher to lead class discussion on the meaning of tissues, organs and body systems.	<ul style="list-style-type: none"> • Fresh preserved specimen of different tissues. • Charts/models of plant and animal tissues and organ. 	Is the student able to explain the concept of cell differentiation?	
	b) outline the importance of cell differentiation and formation of tissues, organs and body systems.	i) The teacher to lead a class discussion on the importance of cell differentiation and formation of tissues, organs and body systems. ii) Students to outline the importance of cell differentiation and formation of tissues, organs and body systems.	Fresh/preserved specimen/charts/models of plant and animal tissues and organs.	Is the student able to outline the importance of cell differentiation and formation of tissues, organs and body system?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) differentiate cells, tissues, organs and body systems.	i) The teacher to lead a discussion on the formation of tissues, organs and body systems and differences existing between them. ii) Students to differentiate cells, tissues, organs and body systems.	Charts/models of plant and animal tissues and organs.	Is the student able to differentiate cells, tissues, organs and body systems?	
5.0 CLASSIFICATION OF LIVING THINGS 5.1 Concept of Classification.	The student should be able to: a) explain the concept of classification. b) explain the importance of classifying living things.	i) The teacher to organize study visit to places where items are systematically grouped (laboratory, school library, nearby shop, nearby market, pharmacy). ii) Students in groups to discuss on how various items are grouped systematically. i) Students to brainstorm on the importance of classifying living things. ii) The teacher to summarize students' responses and make necessary clarification and conclusion.	<ul style="list-style-type: none"> • Library. • Laboratory. • Nearby shop. • Pharmacy. • Market. <ul style="list-style-type: none"> • Charts on classification of organisms. • Pictures/ photographs of various organisms. • Preserved or live specimen of living things. 	Is the student able to explain the concept of classification? Is the student able to explain the importance of classifying living things?	6

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) group living things according to their similarities and differences.	i) Students to collect variety of living things. ii) The teacher to design practical work for students to observe and group a variety of organisms according to their similarities and differences. iii) Students to group living things according to their similarities and differences.	<ul style="list-style-type: none"> • Pictures. • Photographs of various organisms. • A variety of living and non-living things. 	Is the student able to group living things according to their similarities and differences?	
5.2 Classification Systems.	The student should be able to: a) outline types of classification systems and their differences.	i) The teacher to lead students to brainstorm on classification systems. ii) Students in groups to discuss types of classification and their differences.	<ul style="list-style-type: none"> • A variety of living things. • Chart/pictures of a variety of living things. 	Is the student able to outline types of classification systems?	4
	b) explain merits and demerits of each type of classification system.	i) Students to brainstorm on the merits and demerits of each type of classification system. ii) The teacher to guide students to summarise their responses and give conclusions.	<ul style="list-style-type: none"> • Charts/pictures of a variety of living things. • Preserved/live specimen of living things. 	Is the student able to explain the merits and demerits of each classification system?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) carry out practical activities to classify living things according to artificial and natural classification. systems.	i) The teacher to design simple practical work on grouping living things using each classification system. ii) Students to carry out practical exercise on classification of organisms basing on artificial and natural classification systems.	<ul style="list-style-type: none"> • A variety of living organisms. • Chart/pictures of variety of living things and non-living things. 	Is the student able to carry out practical activities to classify living things according to artificial and natural classification systems?	
5.3 Major Groups of Living Things.	The student should be able to: a) mention major groups of living things.	i) The teacher to lead a class discussion on the major groups of living things (Virus, Monera, Protocista, Fungi, Plantae, Animalia). ii) Students to observe various living things and put them into their major groups.	<ul style="list-style-type: none"> • A variety of living organisms. • Charts/pictures of variety of living things. 	Is the student able to mention major groups of living things?	2
	b) outline ranks of classification.	i) Students to observe representative of living things and discuss their ranks. ii) The teacher to lead a class discussion on the ranks of classification.	Representative samples of each group of living things.	Is the student able to outline ranks of classification?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) carryout practical activities to group organisms into their respective major groups.	i) The teacher to design practical work on grouping organisms into their respective major groups. ii) Students to carry out practical activities of grouping organisms into their respective major groups.	<ul style="list-style-type: none"> • Chart/pictures of variety of living things. • Representative organisms of each group of living things. 	Is the student able to carry out practical activities to group organisms into their major groups?	
5.4 Viruses.	The student should be able to: a) explain general and distinctive features of viruses.	i) Students in groups to observe charts/models/pictures of viruses and record their physical characteristics. ii) The teacher to lead a class discussion on the general and distinctive features of viruses.	Charts and micrographs of viruses.	Is the student able to explain general and distinctive features of viruses?	4
	b) describe the structure of viruses.	i) Students in groups to observe charts/models/pictures of viruses. ii) The teacher to lead a class discussion on the structures of viruses. iii) Students to draw and label the diagram of viruses.	Charts and micrographs of viruses.	Is the student able to describe the structure of viruses?	
	c) outline advantages and disadvantages of viruses.	i) The teacher to lead students to brainstorm on the advantages and disadvantages of viruses.	<ul style="list-style-type: none"> • Charts and micrographs of viruses. • Extracts/texts of characteristics of viruses. 	Is the student able to outline advantages and disadvantages of viruses?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
5.5 Kingdom Monera.	<p>The student should be able to:</p> <p>a) explain general and distinctive features of the Kingdom Monera.</p>	<p>ii) Students to outline the advantages and disadvantages of viruses.</p> <p>i) Students in groups to observe charts/models/pictures of representative organisms of the kingdom Monera (Bacteria) and record the observable features.</p> <p>ii) The teacher to lead a class discussion on the general and distinctive features of Bacteria.</p>	Charts/models/pictures Bacteria.	Is the student able to explain general and distinctive features of the Kingdom Monera?	10
	<p>b) describe structures of the representative organisms of the kingdom Monera.</p>	<p>i) Students in groups to observe charts/models/pictures of Bacteria and identify their structures.</p> <p>ii) The teacher to guide students to draw a well labelled diagram of Bacteria.</p>	Charts/models/pictures of Bacteria.	Is the student able to describe structures of the representative organisms of the kingdom Monera?	
	<p>c) outline the advantages and disadvantages of bacteria.</p>	<p>i) The teacher to lead students to brainstorm on the advantages and disadvantages of bacteria.</p> <p>ii) The teacher to record the students' responses and make relevant clarifications.</p>	<ul style="list-style-type: none"> • Samples of antibiotics. • Charts/models/ pictures of Bacteria. • Yoghurt. • Cheese. • Root nodules of leguminous plants • Samples of antibiotics. 	Is the student able to outline advantages and disadvantages of bacteria?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		iii) Students to outline advantages and disadvantages of bacteria.			
	d) outline the characteristics of pathogenic and non- pathogenic bacteria.	Students in groups to discuss the characteristics of pathogenic and non-pathogenic bacteria.	<ul style="list-style-type: none"> Charts/Models pictures of Bacteria. Yoghurt Cheese. Root includes leguminous plants. 	Is the student able to outline the characteristics of pathogenic and non-pathogenic bacteria?	
5.6 Kingdom Protoctista.	The student should be able to: a) explain general and distinctive features of the kingdom Protoctista.	i) Students in groups to observe charts/ models/pictures of Amoeba, Euglena and Paramecium. ii) The teacher to lead a class discussion on the general and distinctive features of the Kingdom Protoctista.	<ul style="list-style-type: none"> Charts/models/ pictures/live or preserved specimen of Amoeba, Euglena and Paramecium. Microscope. 	Is the student able to explain general and distinctive features of the kingdom Protoctista?	
	b) mention phyla of the kingdom Protoctista.	i) Student to observe charts/models/ pictures/live or preserved specimen of Amoeba, Euglena and Paramecium. ii) The teacher to guide students to group organism according to their similarities and differences and state their phyla.	Charts/models/pictures/ live or preserved specimen of Amoeba, Euglena Paramecium and Plasmodium.	Is the student able to mention phyla of the kingdom Protoctista?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>c) describe structures of Amoeba, Euglena and Paramecium.</p>	<p>i) Students to observe charts/ models/pictures/ specimen of Amoeba, Euglena Paramecium. ii) The teacher to lead students to identify structures of Amoeba, Euglena and Paramecium. iii) Students to draw and label the diagram of Amoeba, Euglena and Paramecium.</p>	<p>Charts/models/pictures/ live or preserved specimen of Amoeba, Euglena and Paramecium.</p>	<p>Is the student able to describe the structures of Amoeba, Euglena and Paramecium?</p>	
	<p>d) explain the advantages and disadvantages of Amoeba, Euglena Paramecium and Plasmodium.</p>	<p>i) The teacher to lead students to brainstorm on the advantages and disadvantages of representative organisms under the kingdom Protoctista. ii) Students to outline advantages and disadvantages of Amoeba, Euglena and Paramecium.</p>	<p>Charts/models/pictures/ specimens of Amoeba, Euglena and Paramecium and Plasmodium.</p>	<p>Is the student able to explain the advantages and disadvantages of Amoeba, Euglena Paramecium and Plasmodium?</p>	

FORM TWO

CLASS LEVEL COMPETENCES

Student should have the ability to:

1. Make appropriate use of basic biological concepts, principles and skills to evaluate the roles of various physiological processes in plants and animals.
2. Demonstrate use of biological practical skills in studying various physiological processes in plants and animals.
3. Group organisms according to their similarities and differences.
4. Appreciate nature and ensure sustained interaction of organisms in the natural environment.
5. Demonstrate appropriate use of biological principles and skills in solving health related problems.

CLASS LEVEL OBJECTIVES

By the end of form two course, the student should be able to:

- a) Acquire basic knowledge, concepts, principles and skills in evaluating the roles of various physiological processes in animals and plants.
- b) Apply appropriate skills in processing, preserving and storing food.
- c) Apply biological practical skills in studying physiological processes in plants and animals.
- d) Classify organisms in their respective Kingdoms and Phyla/ Divisions.
- e) Develop positive attitudes towards proper use of natural heritage and management of the environment for sustainable development.
- f) Apply appropriate biological principles and skills in solving various health related problems.

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
1.0 CLASSIFICATION OF LIVING THINGS 1.1 Kingdom Fungi.	The student should be able to a) explain the general and distinctive features of the Kingdom Fungi.	i) The teacher to guide students in groups to observe the collected samples/diagrams/pictures and discuss the general and distinctive features of the Kingdom Fungi. ii) Students to share their group findings with others in plenary discussion and the teacher to clarify misconceptions and make general comments.	<ul style="list-style-type: none"> • Yeast. • Mucor. • Mushrooms. • Molds. • Pictures/charts of common Fungi. 	Is the student able to explain the general and distinctive features of the Kingdom Fungi?	4
	b) state the phyla of the Kingdom Fungi.	i) The teacher to guide students through questions and answers to list down the phyla of the Kingdom Fungi such as Ascomycota (yeast), Zygomycota (mucor), Basidiomycota (Mushroom). ii) Students to record and summarize major points on the phyla of the Kingdom Fungi.	<ul style="list-style-type: none"> • Charts/diagrams of organisms under the Kingdom Fungi. • Yeast. • Mucor. • Mushrooms. 	Is the student able to state the phyla of the kingdom Fungi?	
	c) describe the structures of the representative organisms of each phylum (Yeast, Mushroom and Mucor).	i) The teacher to display samples/pictures/diagrams of organisms in each representative phylum of the Kingdom Fungi for students to observe and discuss their general and distinctive features.	<ul style="list-style-type: none"> • Chart/diagrams pictures of yeast, Mucor and Mushroom. • Yeast. • Mucor. • Mushrooms. 	Is the student able to describe the structures of the representative organisms of the Kingdom Fungi?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	ii) Students in groups to record their responses and report in plenary discussion. d) outline advantages and disadvantages of the kingdom Fungi.	i) The teacher to lead students to brainstorm on the advantages and disadvantages of the Kingdom Fungi. ii) Students to synchronize their responses and outline advantages and disadvantages of the Kingdom Fungi. iii) The teacher to guide a class discussion on the advantages and disadvantages of the Kingdom Fungi.	Samples of yeasts, Mucor and Mushroom.	Is the student able to outline advantages and disadvantages of the Kingdom Fungi?	
1.2 Kingdom Plantae.	The student should be able to: a) explain general and distinctive features of the Kingdom Plantae. b) state the divisions of the Kingdom Plantae.	i) Students in groups to observe variety of plants or parts of the plant and discuss the general and distinctive feature ii) The teacher to guide a class discussion on the general and distinctive features of the Kingdom Plantae.	Variety of plants. Chart on the divisions of the Kingdom Plantae.	Is the student able to explain the general and distinctive features of the Kingdom Plantae? Is the student able to state the divisions of the Kingdom Plantae.	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
1.2.1 Division Bryophyta.	The student should be able to: a) explain general and distinctive features of the division Bryophyta.	ii) Students to record the major points and list down the divisions of the Kingdom Plantae. i) Students in groups to observe plants, pictures diagrams or photographs of organisms belonging to the division Bryophyta and discuss the general and distinctive features. ii) Students to present their group work in plenary discussion and the teacher to make necessary clarification.	<ul style="list-style-type: none"> • Texts/extracts on distinctive features of the division Bryophyta. • Moss plants. • Pictures or photographs showing variety of plants. 	Is the student able to explain the general and distinctive features of the division of Bryophytes?	2
	b) describe the structure of Mosses. c) outline advantages and disadvantages of Mosses.	i) The teacher to prepare guidelines on the characteristic features of Mosses. ii) Students to discuss in groups using guidelines provided and describe the characteristic features of Mosses. iii) Students to draw well labeled diagrams of Mosses.	<ul style="list-style-type: none"> • Samples Mosses. • Pictures/Diagrams showing the structures of Mosses. 	Is the student able to describe the structures of Mosses?	
		i) The teacher to guide a class discussion on the advantages and disadvantages of Liverworts and Mosses.	Samples of Liverworts Mosses.	Is the student able to outline advantages and disadvantages of Mosses?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
1.2.2 Division Filicinophyta (Pteridophyta).	<p>Students should be able to:</p> <p>a) explain general and distinctive features of the division Filicinophyta.</p> <p>b) describe the structure of Ferns.</p> <p>c) outline advantages and disadvantages of Ferns.</p>	<p>ii) Students to record and summarize the major points on the advantages and disadvantages of Mosses.</p> <p>i) The teacher to guide students in groups to observe variety of plants belonging to the division Filicinophyta and discuss their general and distinctive features.</p> <p>ii) Students to share their group findings with others in a plenary discussion and the teacher to make necessary clarifications.</p> <p>i) Students in groups to discuss the structures of fern and draw well labeled diagrams.</p> <p>ii) The teacher to guide a class discussion on the structures of Ferns and make general comments on students drawings.</p> <p>i) The teacher to guide a class discussion on the advantages and disadvantages of Ferns.</p> <p>ii) Students to record and summarize major points.</p>	<ul style="list-style-type: none"> • Ferns. • Charts/diagrams/pictures of ferns. <ul style="list-style-type: none"> • Chart/pictures showing the structure of ferns. • Samples of fern. <p>Samples of Fern.</p>	<p>Is the student able to explain general and distinctive features of the division Filicinophyta?</p> <p>Is the student able to describe the structure of Ferns?</p> <p>Is the student able to outline advantages and disadvantages of Ferns?</p>	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
2.0 NUTRITION 2.1 Concepts of Nutrition and Food Nutrients.	The student should be able to: a) explain the concepts of nutrition and food nutrients.	i) The teacher to guide students to brainstorm on the meaning of nutrition and food nutrients. ii) Students to synthesize their responses and record the major points. iii) The teacher to guide students to summarize their responses and make clarification.	<ul style="list-style-type: none"> • Charts displaying different food substance. • A variety of food substance. 	Is the student able to explain the concepts of nutrition and food nutrients?	2
2.2 Nutrition in Mammals. 2.2.1 Human Nutrition.	The student should be able to: a) identify different types of food substances and their functions in human body.	i) Students in groups to observe variety of food substances/ charts/pictures showing different food substances and list down different types of food substances. ii) The teacher to guide a class discussion on different types of food substances displayed and their functions.	<ul style="list-style-type: none"> • Charts displaying different food substances. • A variety of food substances. 	Is the student able to outline the importance of nutrition in living things?	8
	The student should be able to: a) identify different types of food substances and their functions in human body.	i) Students in groups to observe variety of food substances/ charts/pictures showing different food substances and list down different types of food substances. ii) The teacher to guide a class discussion on different types of food substances displayed and their functions.	<ul style="list-style-type: none"> • A variety of food substances. • Charts/pictures displaying different food substances? 	Is the student able to identify different types of food substances and their functions in human body?	8

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) explain the concept of balanced diet in terms of food quantity and quality.	i) The teacher to guide class discussion on the meaning of balanced diet in terms of food quality and quantity. ii) Students to brainstorm on the importance of balanced diet.	<ul style="list-style-type: none"> • Charts/pictures showing variety of balanced diets. • A variety of food substances. 	Is the student able to explain the concept of balanced diet in terms of food quality and quantity?	
	c) explain nutritional requirement for different groups of people.	i) Students in groups to discuss nutritional requirements of different groups of people (expectant and lactating mothers, children, the elderly, the sick, sedentary workers and people living with HIV and AIDS. ii) Students to present group tasks for plenary discussion the teacher to assist them in making necessary corrections and clarifications.	<ul style="list-style-type: none"> • A variety of food substances. • Charts/pictures/ photographs of different groups of people and their nutritional requirements. 	Is the student able to explain the nutritional requirements for different groups of people?	
	d) outline different types of Nutritional deficiencies and disorders in human being.	i) The teacher to display pictures/ photographs/charts showing different groups of people with nutritional deficiencies and disorders.	<ul style="list-style-type: none"> • Photographs/ charts/ pictures showing different groups of people with nutritional deficiencies and disorders. • Magazines/Journals on nutritional deficiencies and disorders in human beings. 	Is the student able to outline different types of nutritional deficiencies and disorders in human being?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) Students to observe the displayed photographs/ charts and outline types of nutritional deficiencies and disorders in human such as marasmus, kwashiorkor, obesity and anorexia nervosa (slimmer's disease).			
	e) explain the causes, symptoms, effect and control measures of nutritional deficiencies and disorders in human beings.	i) Students using given guidelines to discuss in groups the causes, symptoms, effects, and control measures of nutritional deficiencies and disorders in human. ii) Students to present the group tasks in plenary discussion and the teacher to assist them in making necessary corrections and conclusion.	<ul style="list-style-type: none"> Photographs, charts showing different groups of people with nutritional deficiencies and disorders. Articles nutritional deficiencies and disorders. 	Is the student able to explain causes, symptoms, effect and control measures of nutritional deficiencies and disorders in human being?	
2.2.2. Digestive system in Human.	The student should be able to: a) identify parts of the human digestive system and their adaptive features.	i) Students in groups to observe pictures diagrams/ models/ specimen showing parts of the digestive system and identify parts of the digestive system of human. ii) Students to draw well labeled diagram of the human digestive system.	<ul style="list-style-type: none"> Models/charts/ diagrams of the Human digestive system. Mouse. Dissecting kit. Dissecting tray/ dissecting board. Chloroform. Cotton wool. Water. Trough. 	Is the student able to identify parts of the human digestive system and their adaptive feature?	8

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>iii) Using guiding questions to students in groups to discuss the meaning of digestive system and their adaptive features.</p> <p>i) The teacher to guide students in groups to discuss the process of digestion in human and the roles of different enzymes.</p> <p>ii) Students to present group tasks for plenary discussion and the teacher to guide them to make necessary corrections.</p> <p>i) The teacher to guide students to identify different parts of the digestive system of the ruminants.</p> <p>ii) Students in groups to discuss the differences between the digestive system of ruminants and that of human.</p> <p>i) Students in groups to discuss common disorders and diseases of the digestive system in human (e.g. dental caries, heart burn, intestine ulcers, constipation and flatulence).</p>	<p>iii) Using guiding questions to students in groups to discuss the meaning of digestive system and their adaptive features.</p> <p>i) The teacher to guide students in groups to discuss the process of digestion in human and the roles of different enzymes.</p> <p>ii) Students to present group tasks for plenary discussion and the teacher to guide them to make necessary corrections.</p> <p>i) The teacher to guide students to identify different parts of the digestive system of the ruminants.</p> <p>ii) Students in groups to discuss the differences between the digestive system of ruminants and that of human.</p> <p>i) Students in groups to discuss common disorders and diseases of the digestive system in human (e.g. dental caries, heart burn, intestine ulcers, constipation and flatulence).</p>	<p>Models/charts/ diagrams of the human digestive system.</p> <ul style="list-style-type: none"> Articles from journals on digestion process in human. <p>Models/charts/ diagrams of the human and ruminant, digestive systems.</p> <ul style="list-style-type: none"> Extract from journal/ magazines on digestion process. <p>Charts/photographs showing common disorders/diseases of the human digestive system.</p> <ul style="list-style-type: none"> Video/film on diseases and disorders of the human digestive systems. 	<p>Is the student able to explain the process of digestion in human being?</p> <p>Is the student able to compare the human digestive system with that of other mammals?</p> <p>Is the student able to outline common disorders and diseases of the human digestive system?</p>	
	<p>b) explain the process of digestion in human being.</p> <p>c) compare the human digestive system with that of other mammals.</p> <p>d) outline common disorders and diseases of the human digestive system.</p>				

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) The teacher to guide a class discussion on the common disorders and diseases of the human digestive system.</p> <p>i) Students in groups to discuss causes, symptoms, effects and control measures of common disorders and diseases of the human digestive system.</p> <p>ii) The teacher to invite a guest speaker (health specialist) to talk on causes, symptoms, effects and control measures of the common disorders/ diseases of the digestive system.</p> <p>iii) Students to summarise major points from the guest speaker's presentation and the teacher to guide them to generate major points and make conclusions.</p>	<p>ii) The teacher to guide a class discussion on the common disorders and diseases of the human digestive system.</p> <p>i) Students in groups to discuss causes, symptoms, effects and control measures of common disorders and diseases of the human digestive system.</p> <p>ii) The teacher to invite a guest speaker (health specialist) to talk on causes, symptoms, effects and control measures of the common disorders/ diseases of the digestive system.</p> <p>iii) Students to summarise major points from the guest speaker's presentation and the teacher to guide them to generate major points and make conclusions.</p>	<ul style="list-style-type: none"> • Charts. • Video/film on common disorders of the human digestive system. • Chart/pictures showing disorders of the digestive system. 	<p>Is the student able to explain causes, symptoms, effects and control measures of common disorders/ diseases of the digestive system in human being?</p>	
<p>2.3 Nutrition in Plants. 2.3.1 Mineral Requirement in Plants.</p>	<p>The student should be able to:</p> <p>a) mention essential mineral elements in plant nutrition.</p>	<p>i) The teacher to guide students to brainstorm on essential mineral elements in plant nutrition (Nitrogen, Phosphorous, Potassium, magnesium, calcium and Iron).</p>	<ul style="list-style-type: none"> • Samples of inorganic and organic fertilizers. • Chart showing types of organic and inorganic fertilizers. 	<p>Is the student able to mention essential elements in plant nutrition?</p>	6

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students in groups to observe charts/samples of fertilizers and list the essential mineral elements in plant nutrition.</p> <p>iii) The teacher to guide students to make group presentation and make necessary clarification.</p>	<p>i) The teacher to display plants pictures/photographs showing problems associated with nutrients availability for students to observe and discuss the roles, excess and deficiency symptoms of essential mineral elements.</p> <p>ii) The teacher to lead class discussion on the roles, excess and deficiency symptoms of the essential mineral elements in plant nutrition.</p> <p>iii) The teacher to guide students in groups to set up small plot field experiment to investigate effects of excess and deficiency supply of essential mineral elements in plants.</p>	<ul style="list-style-type: none"> • Inorganic fertilizers. • Hand hoes. • Watering can. • Water. • Measuring tape. • Charts/photographs showing healthy plants, plants with excess and deficiency symptoms of essential mineral elements. 	<p>Is the student able to investigate the roles of essential mineral elements in plant nutrition?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		iv) Students to make progressive observations and record results. v) The teacher to guide a class discussion on interpreting results of the experiments and make conclusions.			
2.3.2 Photosynthesis.	The student should be able to: a) explain the concept of photosynthesis. b) describe the structure of the leaf in relation to photosynthesis.	i) The teacher to guide students to discuss in groups the meaning and importance of photosynthesis. ii) Students to present group task, summarize correct responses and make conclusion.	Charts/diagrams/ drawings on the process of photosynthesis. <ul style="list-style-type: none"> • Models/charts/ diagrams/slides showing the internal structures of a leaf. • Microscope • Microscope slides • Stains • Razors/knife • Leaves e.g Hibiscus leaf/ beans leaf/ cassava leaf 	Is the student able to explain the concept of photosynthesis? Is the student able to describe the structure of the leaf in relation to photosynthesis	6

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) explain the process of photosynthesis.	i) The teacher to guide students in groups to discuss the process of photosynthesis. ii) The teacher to guide students in groups to design and conduct experiments to verify raw materials, conditions and products of photosynthesis (carbon dioxide, water, chlorophyll, sunlight energy, oxygen and starch). iii) Students in groups to analyze experimental results and share their responses in plenary discussion.	<ul style="list-style-type: none"> • Opaque paper. • Clips. • Water. • Ethanol. • White tile. • Iodine solution. • Variegated leaves. • Flasks. • Sodium Hydroxide. • Cotton wool. • Beakers. • Leaves. • Wooden splint. • Funnels. • Pond weed e.g. • Elodea. • Heat source e.g. Bunsen burner, stove, charcoal wood. 	Is the student able to explain the process of photosynthesis?	
	d) outline the importance of photosynthesis in the real life situation.	i) The teacher to guide students through questions and answers to explain the importance of photosynthesis in the real life situation. ii) Students to synthesize their responses and record major points on importance of photosynthesis in the real life situation.	<ul style="list-style-type: none"> • Chart/drawings on photosynthesis process. • Variety of plants. • Variety of storage organs of plants. 	Is the student able to outline the importance of photosynthesis in the real life situation?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
2.4 Properties of food substances.	<p>The student should be able to:</p> <p>a) mention the basic food substances and their properties.</p> <p>b) identify common reagents and chemicals used to determine food properties.</p>	<p>i) The teacher to display a variety of sources of food substances.</p> <p>ii) Students in groups to classify varieties of food substances.</p> <p>i) The teacher to display reagents and chemicals used to determine food properties.</p> <p>ii) The teacher to lead a class discussion on the types and uses of reagents and chemicals in the determination of food properties.</p>	<p>A variety of sources of food substances such as eggs, cassava, potatoes, a piece of sugar cane, coconut, ground nuts, cooking oil, an onion bulb.</p> <ul style="list-style-type: none"> • Iodine solution. • Sudan III. • Benedicts solution. • Dilute HCl. • NaOH. • Copper Sulphate solution. 	<p>Is the student able to mention the basic food substances and their properties?</p> <p>Is the student able to identify common reagents and chemicals used to determine food properties?</p>	6
	<p>c) carryout food tests for reducing sugars, non reducing sugars, starch, proteins and lipids (fats and oil).</p>	<p>i) The teacher to demonstrate on how to carry out food test for different sources of food.</p> <p>ii) Students in groups to carry out food test on starch, reducing sugar, non reducing sugar, lipids and proteins.</p> <p>iii) Students to present their experimental report in plenary discussion.</p>	<ul style="list-style-type: none"> • Test tubes. • Holders. • Dropper. • Source of heat. • Test tube rackers. • Sudan III. • Na OH. • Dilute HCl. • Knife/scalpel. • Eggs, cassava/ potatoes/ maize flour, sugar cane, ground nuts, coconut, onions and cooking oil. 	<p>Is the student able to carryout food tests for reducing sugars, non reducing sugars, starch proteins and lipids?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
2.5 Food Processing, preservation and Storage.	<p>The student should be able to:</p> <p>a) explain the concepts of food processing, food preservation and food storage.</p>	<p>i) The teacher to guide students to brainstorm on the concepts of food processing, preservation and food storage.</p> <p>ii) Students to organize their responses and record the major points.</p> <p>iii) Students in groups to discuss and identify which of the food samples are raw materials processed and preserved.</p>	<ul style="list-style-type: none"> • Samples of raw food substances. • Samples of processed food substance. • Samples preserved food substances. 	<p>Is the student able to explain the concepts of food processing, preservation and storage?</p>	4
	<p>b) explain the importance of food processing, preservation and storage.</p>	<p>i) Students in groups to discuss the importance of food processing, storage and preservation.</p> <p>ii) The teacher to guide presentation and discussion.</p>	<ul style="list-style-type: none"> • Photographs of processed, preserve and stored foods. • Samples of processed preserved and stored food. 	<p>Is the student able to explain the importance of food processing, preservation and storage?</p>	
	<p>c) investigate various methods of food processing, preservation and storage.</p>	<p>i) The teacher to organise a study visit to processed preserved and stored food.</p> <p>ii) Students in groups to discuss and make presentations on various methods of food processing, preservation and storage.</p> <p>iii) The teacher to make clarification and conclusion.</p>	<p>A variety of food substances (vegetables, grains, fruits, meat).</p>	<p>Is the student able to investigate various methods of processing, preserving and storing food?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	d) differentiate between traditional and modern methods of processing, preserving and storing food.	i) The teacher to use questions and answers to guide students to list down modern and traditional methods of processing, preserving and storing food. ii) Students in groups to discuss the differences between traditional and modern methods of processing, preserving and storing food.	<ul style="list-style-type: none"> Variety preserved and processed foods such as fruits vegetables/ meat grains beans and fish. Pictures photographs showing various preserved and processed foods. 	Is the student able to differentiate between traditional and modern methods of processing, preserving and storing food?	
3.0 BALANCE OF NATURE 3.1 The Natural Environment.	The students should be able to: a) explain the concept of natural environment. b) describe biotic and abiotic components of the environment.	i) Students guided by the teacher to visit school compounds and nearby surrounding to observe the major features of the environment. ii) Students in groups of discuss the natural environment in nearby surroundings. iii) The teacher to lead plenary discussion and conclusion.	Photographs of natural environment e.g national parks, game reserves, forest, plain, and mountains.	Is the student able to explain the concept of natural environment?	8

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>c) identify various organism in their natural environment in the community.</p>	<p>i) The teacher to guide students to observe various living and non-living components in their natural habitats. ii) Students to record the observed living and non living components and present their observations. iii) The teacher to lead a class discussion on the characteristics of the natural environment in their community.</p>	<p>Pictures/charts showing the nature of the environment.</p>	<p>Is the student able to identify various organisms in their natural environment?</p>	
	<p>d) explain the importance of the natural environment.</p>	<p>i) The teacher to guide students through questions and answers to explain the importance of the natural environment. ii) Students to summarize their response and write down the major points.</p>	<ul style="list-style-type: none"> • Natural habitats of different types (ponds, shrubs, rocky hill and wood land). • Photographs depicting various environments. • School surroundings • Video tapes/film. 	<p>Is the student able to explain the importance of the natural environment?</p>	
<p>3.2 Interaction of Organisms in the Environment.</p>	<p>The student should be able to: a) identify ways in which living organisms interact with the non living component of the environment.</p>	<p>i) The teacher to organize a field study of different habitats near the school. ii) Students to carry out field visit to observe how living organisms interact with the non-living components of the environment.</p>	<ul style="list-style-type: none"> • Natural habitats of different types (pond, stream, shrub, rock hill and wood land). • Organism in their natural habitats. 	<p>Is the student able to identify ways in which living organisms interact with non living components of the environment?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) explain interaction of organisms.	i) The teacher to guide students to observe interactions among living organisms in their natural habitats. ii) Students in groups to discuss how living organisms interact among themselves and the teacher to guide them in making clarification and conclusion.	Charts/photographs showing various living things in their natural environment.	Is the student able to explain interaction of organisms?	
3.3 Food Chain and Food Web.	The student should be able to: a) explain the meaning of food chain and food web. b) mention the components of a food chain and food web.	i) The teacher to organize a study visit to school surroundings, nearby pond river to observe different organisms in their natural environment. ii) Students to observe the organisms in their natural environment and how they obtain their food. iii) Students to summarize their responses and write down the major points.	<ul style="list-style-type: none"> • Organisms in their natural habitats. • Charts/pictures showing feeding relationships among organisms. 	Is the student able to explain the meaning of food chain and food web?	
	c) differentiate between food chain and food web.	i) The teacher to assign group tasks for students to illustrate food chain and food web by considering organisms in the school or home environment.	Diagrams/charts showing food chain and food web.	Is the student able to differentiate between food chain and food web?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) Students in groups to discuss the differences between food chain and food web. iii) Students to present group tasks in plenary discussion and the teacher to guide them to make necessary clarifications and conclusion.			
	d) construct a diagrammatic representation of a food chain and food web.	i) Students guided by the teacher to construct a diagrammatic representation of a food chain and food web using examples from their surroundings. ii) The teacher to lead a class discussion on diagrammatic representation of food chain and food web.	<ul style="list-style-type: none"> • Variety of organisms. • Diagrams photographs, pictures and charts showing variety of organisms. 	Is the student able to construct diagrammatic representation of a food chain and food web?	
	e) explain the significance of food chain and food web in real life situation.	i) The teacher to guide students to establish an aquarium and to observe how different organisms depend on each other. ii) The teacher to guide a class discussion on the significance of food chain and food web in Balance of Nature.	<ul style="list-style-type: none"> • A chart showing various types of food chain and food web. • Aquarium. 	Is the student able to explain the significance of food chain and food web in real life situation?	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
<p>4.0 TRANSPORT OF MATERIALS IN LIVING THINGS</p> <p>4.1 The concept of Transport of Materials in Living Things.</p>	<p>The student should be able to:</p> <p>a) explain the concept of transport of materials in living things.</p> <p>b) outline the importance of transport of materials in living things.</p>	<p>i) The teacher to lead students to discuss in groups the concept of transport of materials.</p> <p>ii) i) Students to present their group assignments in plenary session and the teacher to guide students to construct the meaning of the concept using their responses.</p> <p>i) The teacher to guide students to brainstorm on importance of transport of materials in living things.</p> <p>ii) Students to synthesize their responses and explain the importance of transportation of materials in living things.</p>	<p>Charts/photographs/ models showing transport of materials in living things.</p> <p>Charts/photographs/ models showing transport of materials in living things.</p>	<p>Is the student able to explain the concept of transport of materials in living things?</p> <p>Is the student able to outline the importance of transport of materials in living things?</p>	<p>2</p>
<p>4.2 Diffusion, Osmosis and Mass flow.</p>	<p>The student should be able to:</p> <p>a) explain the meaning of osmosis, diffusion and mass flow.</p>	<p>i) The teacher to guide students in groups to discuss the meaning of osmosis, diffusion and mass flow.</p> <p>ii) Students to present group tasks for plenary discussion and the teacher to guide them in making necessary corrections.</p>	<ul style="list-style-type: none"> • Potassium permanganate. • Water. • Beakers. • Thistle funnel. • Cellophane paper. • Copper sulphate crystals. • Retort clamp. • Retort stand. • Perfume. • Air freshner. • Variety of flowers and herbs. • Napthalene balls. 	<p>Is the student able to explain the meaning of diffusion, osmosis and mass-flow?</p>	<p>4</p>

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>b) carry out experiments to demonstrate the process of diffusion, osmosis and mass flow.</p>	<p>i) The teacher to demonstrate simple experiments on osmosis, diffusion and mass flow. ii) Students in groups to carry out experiments on osmosis, diffusion and record their observations. iii) Students in groups using guiding questions to interpret their findings and make conclusions.</p>	<ul style="list-style-type: none"> • Irish potatoes, sugar or table salt, water, heat source, Petri dish or small trough, beaker. • Distilled water. • Pawpaw. • Perfume. • Air fresher. 	<p>Is the student able to carry out experiments to demonstrate the processes of diffusion osmosis and mass flow?</p>	
	<p>c) outline the differences between diffusion, osmosis and mass flow.</p>	<p>i) The teacher to guide students through questions and answers to outline differences between diffusion, osmosis and mass flow. ii) Students to record the differences between diffusion, osmosis and mass flow.</p>	<p>Chart/tables on differences between diffusion and osmosis.</p>	<p>Is the student able to outline differences between diffusion and osmosis?</p>	
	<p>d) explain the roles of diffusion, osmosis and mass flow in movement of materials in living organisms.</p>	<p>i) The teacher to lead students in groups to discuss the roles of osmosis, diffusion and mass flow in movement of materials in living organisms. ii) Students to share their group work in a plenary discussion and the teacher to make clarifications and necessary corrections.</p>	<p>Models, charts, diagrams of circulatory system.</p>	<p>Is the student able to explain the roles of diffusion, osmosis and mass flow in movement of materials in living organisms?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
4.3 Transport of Materials in Mammals. 4.3.1 The Structure of the Mammalian Heart.	The student should be able to: a) describe the external and internal structures of the mammalian heart.	i) Students to observe specimen/ model/or charts showing the external and internal structures of the mammalian heart and identify the main structures. ii) Students to draw and label the external and internal parts of the mammalian heart from a displayed specimen/model/chart or a drawing evaluate students. iii) The teacher to work and give suggestions for improvement.	<ul style="list-style-type: none"> • Mammalian heart (fresh or preserved specimen). • Diagram/model/chart of a mammalian heart. 	Is the student able to describe the external and internal structures of the mammalian heart?.	10
	b) explain the functions of the external and internal parts of the mammalian heart.	i) The teacher to guide students through questions and answers to list the external and internal parts of the mammalian heart. ii) Students to discuss in small groups the functions of the external and internal parts of the mammalian heart group. iii) Students to share their work in plenary presentation session and the teacher to make clarifications.	<ul style="list-style-type: none"> • Models/charts of mammalian heart. • Preserved or fresh specimen of mammalian heart. 	Is the student able to explain the functions of the external and internal parts of the mammalian heart?.	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) explain the adaptations of the parts of the mammalian heart to their functions.	i) Using the provided charts/models and heart specimen, students to discuss in groups the adaptations of parts of the mammalian heart in relation to their functions. ii) The teacher to summarize and make clarifications.	<ul style="list-style-type: none"> • Charts showing parts of the mammalian heart. • Models of the mammalian heart. • Fresh or preserved specimen of the mammalian heart. 	Is the student able to explain the adaptations of the parts of the mammalian heart to their functions?	
	d) describe the structure of arteries, veins and capillaries.	i) The teacher to guide students to brainstorm on types of blood vessels. ii) Students in groups to observe the charts, diagram or specimen and identify the structures of arteries, veins and capillaries. labeled. iii) Students to draw well diagrams of each blood vessels.	<ul style="list-style-type: none"> • Chart/diagram/model/specimen of the mammalian heart and blood vessels. • Dissected mammal. 	Is the student able to describe the structure of arteries, veins and capillaries?	
	e) distinguish between arteries, veins and capillaries.	i) Using the provided charts/diagrams/photographs/models/ dissected mammal specimen, students to discuss in groups the differences between blood vessels. ii) Students to tabulate their responses and share them in a plenary presentation session. iii) The teacher to summarize and make clarifications.	<ul style="list-style-type: none"> • Specimens of dissected mamma with heart and blood vessels. • Charts/diagram photographs/models of the mammalian heart and blood vessels. Is the student able to explain the difference between arteries, veins and capillaries? 	Is the student able to distinguish between arteries, veins and capillary blood vessels?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	f) carry out simple experiments to determine pulse rates in human being.	i) The teacher to guide students in pairs to take pulse rates at the wrist, behind the collar bone, above the left hand side of the breast while at rest and after an exercise. ii) Students to record their findings and share with others in plenary presentation and discussion.	<ul style="list-style-type: none"> • Stop watches. • Recorded pulse rates. • Wrist watches. • Stethoscope. 	Is the student able to carry out experiments to determine pulse rates in human being?	
4.3.2 The Blood.	The student should be able to: a) list major components of the blood. b) explain functions of major blood components.	i) Students to brainstorm on major components of the blood. ii) The teacher to display pictures/ photographs/charts showing the components of blood and explain constitutes of the blood. iii) The teacher to allow students questions and provides answers and clarification.	<ul style="list-style-type: none"> • Pictures/photographs/charts on components of the blood. • Charts/models/ pictures of the major components of the blood. • Slides showing components of the blood. 	Is the student able to list major components of the blood?	4
		i) Students in groups to discuss the structure and functions of the major components of blood. ii) The teacher to lead students group presentations and discussion in plenary.	<ul style="list-style-type: none"> • Charts/models/ photographs of components of the blood. • Slides showing components of the blood. 	Is the student able to explain functions of major components of the blood?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) explain the effects of HIV on white blood cells.	i) The teacher to invite a health specialist to deliver a presentation on effects of HIV on white blood cells. ii) The teacher to guide students to summarize the major points from the guest speaker's speech and make conclusion.	<ul style="list-style-type: none"> • Charts/photographs/video depicting effects of HIV on white blood cells. • Photographs/charts showing emaciated people with full blown HIV and AIDS. 	Is the student able to explain the effects of HIV on white blood cells?	
4.3.3. Blood Groups and Blood Transfusion.	The student should be able to: a) explain the concepts of blood groups and blood transfusion.	i) Students to observe tables/charts and identify the blood groups and their respective antigens and antibodies. ii) The teacher to lead a class discussion on the concepts of blood group and blood transfusion.	Charts and tables showing blood groups and their respective antigens and antibodies.	Is the student able to explain the concepts of blood groups and blood transfusion?	6
	b) outline the relationship between blood groups and blood transfusion.	i) The teacher to lead students to discuss the relationship between blood groups and blood transfusion. ii) Students to synthesize their responses and outline the relationship between blood groups and blood transfusion.	Chart showing blood groups and their respective antibodies and antigens.	Is the student able to outline the relationship between blood groups and blood transfusion?	
	c) explain the advantages and disadvantages of blood transfusion.	i) Teacher to lead students through questions and answers to explain the advantages and disadvantage of blood transfusion.	Pictures/photographs/ charts showing the process of blood transfusion.	Is the student able to explain the advantages and disadvantages of blood transfusion?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) Students to synthesize their responses and categorize them according to similarities. iii) The teacher to summarize, answers, students questions and give clarifications.			
	d) outline precautions to be taken during blood transfusion.	i) The teacher to guide students in groups to discuss the precautions to be taken during blood transfusion. ii) Students to share their group work in a plenary presentation session and discussion.	Charts/pictures/ photographs showing the process of blood transfusion.	Is the student able to outline precautions to be taken during blood transfusion?	
4.3.4 Blood Circulation.	The student should be able to: a) describe blood circulation in human.	i) The teacher to lead the students through questions and answers to describe the process of blood circulation. ii) Students to summarize the major points and explain blood circulation in human body. iii) Students to draw a well labeled diagram of the human blood circulatory system.	Map of the circulatory system drawn on the floor or ground.	Is the student able to describe blood circulation in human?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) explain the importance of blood circulation in humans.	i) Using games and simulations, the teacher to guide students to demonstrate the importance of blood circulation in transporting materials. ii) Students in groups to discuss the importance of blood circulation in humans.	<ul style="list-style-type: none"> • Map of the human circulatory system drawn on the floor. • Chart of the human circulatory system. • Model of the blood circulatory system. 	Is the student able to explain the importance of blood circulation in human?	
	c) mention disorders and diseases of the human blood circulatory system.	i) Using question and answer the teacher to lead the students to mention the disorders and diseases of the human blood circulatory system diabetes and sickle cell anaemia, leukemia and blood pressure (BP). ii) Students to synthesize their responses and summarize the major points on diseases and disorders of the human circulatory system.	Chart/diagram on human circulatory system.	Is the student able to mention disorders and diseases of the human blood circulatory systems?	
	d) outline causes, symptoms, effects and control/ measures of the disorders and diseases of the human blood circulatory system.	i) The teacher to guide students in groups to discuss the causes, symptoms and effects of human blood circulatory system.	<ul style="list-style-type: none"> • A chart on human showing disorders associated with blood circulatory system. 	Is the student able to outline causes symptoms and effects of the disorders and diseases of the human blood circulatory system?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) i) Students to share their work in plenary presentations and discussion and the teacher to guide them to correct misconceptions and make clarifications.</p>	<p>ii) The teacher to provide guidelines, materials, and equipments for measuring pulse rate and blood pressure.</p> <p>ii) Students in pairs to take measurements of pulse rate and blood pressure record their findings and present in class for discussion.</p>	<ul style="list-style-type: none"> Chart and documents on preventive and control measures of the blood circulatory disorders and diseases. 		
<p>e) carry out practical exercises to measure human pulse rate and blood pressure.</p>	<p>i) The teacher to provide pulse rate and blood pressure.</p> <p>ii) Students in pairs to take measurements of pulse rate and blood pressure record their findings and present in class for discussion.</p>	<p>i) The teacher to lead students through questions and answers to describe the meaning and importance of lymphatic system.</p> <p>ii) Students to record the major points on the meaning of lymphatic system and the teacher to clarify.</p>	<p>Materials and equipments for measuring pulse rate and blood pressure.</p>	<p>Is the student able to carry out practical exercise to measure pulse rate and blood pressure?</p>	
<p>4.3.5 The Lymphatic System.</p>	<p>The student should be able to:</p> <p>a) explain the concept of lymphatic system.</p> <p>b) describe the components of the human lymphatic system.</p>	<p>i) The teacher to lead students through questions and answers to describe the meaning and importance of lymphatic system.</p> <p>ii) Students to record the major points on the meaning of lymphatic system and the teacher to clarify.</p>	<ul style="list-style-type: none"> Chart on lymphatic system. Diagrams/drawings on the lymphatic system. 	<p>Is the student able to explain the concept of lymphatic system?</p>	<p>4</p>
	<p>b) describe the components of the human lymphatic system.</p>	<p>i) The teacher to guide students in groups to describe the structure and functions of the lymphatic system.</p>	<p>Chart/diagrams of human lymphatic system.</p>		

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students to draw well labeled diagram of the lymphatic system in human.</p> <p>i) The teachers to guide students through question and answers to discuss the disorders and diseases of the lymphatic system.</p> <p>ii) Students to summarize their responses and list down common disorders and diseases of the human lymphatic system.</p>	<p>ii) Students to draw well labeled diagram of the lymphatic system in human.</p> <p>i) The teachers to guide students through question and answers to discuss the disorders and diseases of the lymphatic system.</p> <p>ii) Students to summarize their responses and list down common disorders and diseases of the human lymphatic system.</p>	<p>Pictures or charts showing the common disorders and diseases of the lymphatic system.</p>	<p>Is the student able to describe the components of the human lymphatic system?</p> <p>Is the student able to mention common disorders and diseases of the lymphatic system?</p>	
	<p>d) explain causes, symptoms, effects and prevention of disorders and diseases of the human lymphatic system.</p>	<p>i) The teacher to guide students in groups to discuss the causes, symptoms and effect of disorders and diseases of the lymphatic system (such as Edema.</p> <p>ii) Students to present their group responses in plenary discussion.</p>	<p>A table drawn on the manila sheet on the causes, symptoms and effects of disorders and diseases of the human lymphatic system.</p>	<p>Is the student able to explain causes, symptoms, effects and prevention of disorders and diseases of the lymphatic system?</p>	
<p>4.4 Transport of Materials in Plants. 4.4.1 The Vascular System.</p>	<p>The student should be able to:</p> <p>a) explain the concept of vascular system.</p>	<p>i) The teacher to display diagrams or mounted slides on transverse sections of the root, stem and leaf.</p>	<ul style="list-style-type: none"> • Microscope. • Mounted slides. 	<p>Is the student able to explain the concept of the vascular system?</p>	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students to draw and label the transverse section of root, stem and leaf of a monocot and dicot.</p> <p>iii) The teacher to lead a discussion on vascular system in flowering plants basing on the observed diagrams or slides.</p>	<p>ii) Students to draw and label the transverse section of root, stem and leaf of a monocot and dicot.</p> <p>iii) The teacher to lead a discussion on vascular system in flowering plants basing on the observed diagrams or slides.</p>			
	<p>b) describe components of vascular system.</p>	<p>i) The teacher to set up and demonstrate an experiment to students on distribution of vascular system in plants.</p> <p>ii) Students in groups to carry out an experiment to investigate the distribution of vascular system in plants.</p> <p>iii) Students to draw and label the distribution of vascular system in monocot and dicot roots, stems and leaves.</p> <p>iv) The teacher to lead class discussion on the distribution of vascular system in plants.</p>	<ul style="list-style-type: none"> • Maize. • Sunflower. • Microscope. • Slides. • Stains. 	<p>Is the student able to describe components of vascular system?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) explain the functions of vascular system in plants.	i) The teacher to guide students to discuss on the functions of phloem and xylem tissues. ii) The teacher to guide students to carry out experiments to demonstrate upward and downward movement of materials in xylem and phloem. iii) Students guided by the teacher to discuss their experimental findings draw, conclusions and share their work in a plenary session.	<ul style="list-style-type: none"> • Potted plants. • Colored water. • Ringed plant. • Charts/diagrams. showing movement of materials in xylem and phloem tissues. 	Is the student able to explain the functions of vascular system in plants?	
4.4.2 Absorption and Movement of Water and Mineral Salts in Plants.	The student should be able to: a) explain the functions of root hairs in absorption and movement of water and mineral salts in plants. b) outline the movement of water and dissolved mineral salts in plants.	i) The teacher to guide students in groups to observe and discuss root hairs on germinated seeds. ii) Students to draw the diagram of a root hair from their observation. iii) Students in groups to discuss the functions of root hairs.	<ul style="list-style-type: none"> • Germinated seeds. • Damp cloth. • Hand lens. 	Is the student able to explain the functions of root hairs in absorption and movement of water and mineral salts in plants?	6
		i) Teacher to display diagrams/charts/models on the movement of water and dissolved minerals from the soil into the root hair. ii) Students to draw and label the diagram showing the movement of water from the root hairs to the xylem cells.	Diagram of plant root Showing root hairs.	Is the student able to outline the movement of water and dissolved mineral salts in plants?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) conduct experiments to demonstrate transpiration pull, root pressure and capillarity.	i) The teacher to guide students in groups to carry out experiments to demonstrate root pressure transpirational pull and capillarity. ii) Students to record their observations discuss in groups and draw conclusions. iii) The teacher to lead plenary discussion and make any necessary clarification.	<ul style="list-style-type: none"> • Potted plants. • Knife. • Two bell jars. • Dry soil. • Cobalt chloride or anhydrous copper sulphate. • Two glass, plates\ Petroleum jelly • Cellophane paper. 	Is the student able to conduct experiments to demonstrate transpiration pull, root pressure and capillarity?	
	d) explain the concept of transpiration.	i) Students in groups to discuss the meaning of transpiration. ii) The teacher to make clarifications and conclusion.	<ul style="list-style-type: none"> • Potted plant. • Picture/charts showing the process of transpiration. 	Is the student able to explain the concept of transpiration?	
	e) outline the significance of transpiration in plants.	i) The teacher to lead students through question and answers to outline the significance of transpiration in plants. ii) Students in groups to discuss the significance of transpiration in plants.	<ul style="list-style-type: none"> • Potted plants. • Pictures/charts showing the transpiration process. 	Is the student able to outline the significance of transpiration in plants?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	f) outline factors affecting the rate of transpiration in plants.	i) The teacher to guide students in groups to carry out an experiment to investigate the effects of transpiration in plant. ii) Students in groups to record their observations and share their group task with others in plenary presentations and discussion. iii) The teacher to lead a plenary discussion and make necessary clarifications.	<ul style="list-style-type: none"> • Leaf shoot. • Rubber tubing. • Glass tubing. • Mercury. • Beaker. • Water. 	Is the student able to outline factors affecting the rate of transpiration in plants?	
5.0 GASEOUS EXCHANGE AND RESPIRATION 5.1 The concept of Gaseous Exchange.	The student should be able to: a) explain the concept of gaseous exchange. b) identify organs responsible for gaseous exchange in living organisms.	i) The teacher to guide students to brainstorm on the meaning and importance of gaseous exchange. ii) Students to summarize and record correct responses given by different individuals.	<ul style="list-style-type: none"> • Variety of living organisms. • Charts/diagrams/ pictures of organisms showing sites of gaseous exchange. 	Is the student able to explain the concept of gaseous exchange?	4
		i) The teacher to guide students in groups to examine sites of gaseous exchange in different organisms. ii) Students in groups to perform practical exercise on examination of gaseous exchange sites in different organisms.	<ul style="list-style-type: none"> • Samples of organisms such as insects, fishes, amphibians and small mammals. • Variety of leaves e.g. elodea leaf. • Hand lens. • Microscope. 	Is the student able to identify organs responsible for gaseous exchange in living organisms?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
5.2 Gaseous Exchange in Mammals.	<p>iii) The teacher to lead a plenary discussion on sites of gaseous exchange in different organisms.</p> <p>The students should be able to:</p> <p>a) identify parts of the respiratory system.</p>	<p>i) The teacher to dissect a mammal and display the structure of the reparatory system.</p> <p>ii) Students to observe the structure of the respiratory system and identify its major parts.</p> <p>iii) The teacher to lead a class discussion on the parts of the respiratory system.</p>	<ul style="list-style-type: none"> • A dissected mammal e.g. mouse. • Dissecting kit. • Chloroform. • Dissecting tray/bowl. • Thread. • Water. • Chart/diagram of respiratory system. 	Is the student able to identify parts of the respiratory system?	6
	<p>b) describe features of different parts of the respiratory system and their adaptive features.</p> <p>c) describe the mechanism of gaseous exchange in mammals.</p>	<p>i) The teacher to guide students to discuss in groups the features of different parts of the respiratory system of a mammal.</p> <p>ii) Students to present their group tasks for plenary discussion and then to guide them in making clarifications and conclusion.</p> <p>i) Students to discuss in group the breathing mechanism in human.</p>	Models/Diagram or chart of the respiratory system.	Is the student able to describe features of different parts of the respiratory system and their adaptive features?	
			Charts/diagrams models on respiratory system.	Is the student able to describe the mechanism of gaseous exchange in mammals?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) The teacher to guide students in groups to demonstrate inhalation and exhalation processes and illustrate the major parts involved.</p> <p>i) Students to observe diagrams/pictures/drawings showing gaseous exchange across the alveolus and draw the diagrams of alveoli.</p> <p>ii) The teacher to lead a class discussion on structures of the alveolus and explain how gaseous exchange takes place across the alveolus.</p> <p>d) describe gaseous exchange across the alveolus.</p> <p>e) outline factors affecting gaseous exchange in mammals.</p>		<ul style="list-style-type: none"> • Pictures or • Diagrams showing an alveolus of the lung. <p>Pictures/charts showing gaseous exchange in mammals.</p>	<p>Is the student able to describe gaseous exchange across the alveolus?</p> <p>Is the student able to outline factors affecting gaseous exchange in mammals?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
5.3 Gaseous Exchange in Plants.	<p>The student should be able to:</p> <p>a) explain the importance of gaseous exchange in plants.</p> <p>b) identify parts of plant responsible for gaseous exchange.</p>	<p>i) The teacher to guide students in groups to discuss the importance of gaseous exchange in plants.</p> <p>ii) Students to present group tasks in plenary discuss on and the teacher to make necessary clarification.</p>	<p>Charts/diagrams/pictures showing the process of gaseous exchange in plants.</p>	<p>Is the student able to explain the importance of gaseous exchange in plants?</p>	
	<p>b) identify parts of plant responsible for gaseous exchange.</p>	<p>i) The teacher to organize a simple field study around the school compound for students to observe different parts of the plant responsible for gaseous exchange.</p> <p>ii) Students to discuss on the parts responsible for gaseous exchange.</p>	<ul style="list-style-type: none"> • Hand lens. • Charts/pictures/diagrams on gaseous exchange in plants. • Plant leaves and shoots. 	<p>Is the student able to identify part of plants responsible for gaseous exchange?</p>	
	<p>c) describe the process of gaseous exchange in plants.</p>	<p>i) The teacher to lead class discussion on the process of gaseous exchange in a leaf.</p> <p>ii) Students to summarize and record important points on the process of gaseous exchange and draw the transverse section of a leaf.</p>	<ul style="list-style-type: none"> • Charts/diagrams/pictures showing the process of gaseous exchange in a leaf. • Pictures/charts showing gaseous exchange in mammals. 	<p>Is the student able to describe the process of gaseous exchange in plants?</p>	
5.4 Respiration.	<p>The student should be able to:</p> <p>a) explain the concept of respiration.</p>	<p>i) Students to brainstorm on the meaning of respiration.</p> <p>ii) The teacher to summarize the correct responses and make conclusion.</p>	<p>Diagrams/charts models on the process of respiration.</p>	<p>Is the student able to explain the concept of respiration?</p>	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) mention types of respiration.	i) The teacher to lead a class discussion on the types of respiration in living things. ii) Students in groups to discuss and summarize the types of respiration.	Extracts of articles from journals/magazines on the types of respiration.	Is the student able to mention types of respiration?	
5.4.1 Aerobic Respiration.	The student should be able to a) explain the concept of aerobic respiration.	i) Students in groups to discuss the meaning of aerobic respiration. ii) The teacher to lead a class discussion on the meaning and importance of aerobic respiration.	Charts/diagrams models on the process of aerobic respiration.	Is the student able to explain the concept of aerobic respiration?	6
	b) outline the mechanism of aerobic respiration.	i) The teacher to lead students through question and answers to explain the mechanism of aerobic respiration. ii) Students to discuss, summarize and record major ideas.	Charts/diagrams on aerobic respiration.	Is the student able to outline the mechanism of aerobic respiration?	
	c) carry out experiments on aerobic respiration.	i) The teacher to lead students in groups to carry out experiments to identify the products of aerobic respiration. ii) Students in groups to record the experimental findings and share with others in plenary presentation and discussion.	<ul style="list-style-type: none"> • Flasks. • Seeds e.g. pea seeds. • Thermometers. • Cotton wool. • Water. • Beakers. • Bunsen burner. • 10% formalin. 	Is the student able to carry out experiments on aerobic respiration?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	d) describe factors which affect the rate of respiration.	i) The teacher to guide students in groups to discuss factors which affect the rate of respiration. ii) Students to present in plenary and teacher to culminate on how factors such (temperature, activity, body size and age affect the rate of respiration.	Wall charts/pictures/ showing the factors that affect the rate of respiration.	Is the student able to describe factors that affect the rate of respiration?	
5.4.2 Anaerobic Respiration.	The student should be able to: a) explain the concept of anaerobic respiration. b) outline the mechanism of anaerobic respiration.	i) The teacher to guide students through questions and answers to discuss the meaning and importance of anaerobic respiration. ii) Students to synthesize their responses and explain the meaning and importance of anaerobic respiration.	Charts/diagrams on anaerobic respiration.	Is the student able to explain the concept of anaerobic respiration?	6
		i) The teacher to guide student through questions and answers to outline the mechanism of anaerobic respiration. ii) Students to summarize major points on mechanisms of anaerobic respiration.	Conical flasks, rubber bands, delivery tubes, beakers, glucose, yeast, water, liquid paraffin, fractionating column, thermometer, test tubes, string.	Is the student able to outline the mechanism of anaerobic respiration?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) mention the end products of anaerobic respiration.	i) The teacher to guide students to carry out experiments to investigate the end products of anaerobic respiration. ii) Students to discuss on the importance of end products of anaerobic respiration in organisms.	Chart on end product anaerobic respiration.	Is the student able to mention the end product of anaerobic respiration?	
	d) carry out experiments to demonstrate the application of anaerobic respiration.	i) The teacher to demonstrate how to carry out experiments on anaerobic respiration. ii) Students in groups to carry out experiments on anaerobic respiration.	Various products of anaerobic respiration.	Is the student able to carry out experiments to demonstrate the application of anaerobic respiration?	
	e) differentiate between aerobic and anaerobic respiration.	i) The teacher to guide students in groups to discuss the differences between aerobic and anaerobic respiration. ii) Students to present their finding in plenary discussion.	Chart/diagram on anaerobic and aerobic respiration.	Is the student able to differentiate between aerobic and anaerobic respiration?	
5.4.3 Infection and diseases of the respiratory system.	The student should be able to: a) mention common airborne infections and diseases affecting respiratory system.	i) The teacher to guide students in groups to discuss common airborne infection, diseases, and disorders such as flu, bronchitis, asthma and lung cancer.	Extracts/texts from journals on common airborne infections.	Is the student able to mention common airborne infections and diseases affecting respiratory systems?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students to share their group work in plenary discussion and the teacher to make any necessary clarifications.</p> <p>b) explain causes, symptoms, effects and control measures of common infections and diseases of the respiratory system.</p>	<p>i) The teacher to guide students through questions and answers to explain causes, symptoms effects and control measures of common infections and diseases of the respiratory system.</p> <p>ii) Students to summarize the major points on the causes, symptoms effects and control measures of the common infections, and diseases of the respiratory system.</p> <p>iii) The teacher to lead a class discussion on the causes symptoms and effects and control measures of the common infections diseases of the respiratory system.</p>	<p>A tabulation of causes, symptoms effects and control of airborne infections on the manila sheet.</p>	<p>Is the student able to explain causes, symptoms, effects and control measures of common infections and diseases of the respiratory system?</p>	
5.4.4 Disorders of the Respiratory System.	<p>The student should be able to:</p> <p>a) mention disorders of the respiratory system.</p>	<p>i) The teacher to guide students to brainstorm on common disorders of the respiratory system.</p>	<p>Charts/diagrams showing disorders of the respiratory system.</p>	<p>Is the student able to mention disorders of the respiratory systems?</p>	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students to summarize their responses and list down common disorders of the respiratory system.</p> <p>b) explain causes, symptoms and effects of the disorders of the respiratory system.</p> <p>c) relate disorders of the respiratory system and HIV and AIDS.</p>	<p>i) The teacher to arrange a study visit to a nearby health facility for students to investigate common disorders of the respiratory system.</p> <p>ii) Students to discuss in group the causes, symptoms and effects of the disorders of the respiratory system.</p> <p>iii) The teacher to lead a class discussion and make clarifications on students presentations.</p> <p>i) The teacher to guide students through questions and answers to point out the relationship between the respiratory system disorders and HIV and AIDS.</p> <p>ii) Students to record and summarize their responses and the teacher to make clarifications on the relationship between the respiratory system disorders and HIV and AIDS.</p>	<p>Charts/diagrams on disorders of the respiratory system.</p> <p>Texts/extracts on the relationship between disorders of the respiratory system and HIV and AIDS.</p>	<p>Is the student able to explain causes, symptoms and effects of disorders of the respiratory systems?</p> <p>Is the student able to relate disorders of the respiratory system and HIV and AIDS?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	d) suggest ways of preventing and controlling disorders of the respiratory system.	i) Students in groups to discuss ways of preventing and controlling disorders of the respiratory system. ii) The teacher to plenary discussion and make general comments and clarifications where necessary.	Extracts/texts from journals or magazines on methods of preventing and controlling disorders of the respiratory system.	Is the student able to suggest ways of preventing and controlling disorders of the respiratory system?	

FORM THREE

CLASS LEVEL COMPETENCES

Student should have the ability to:

1. demonstrate appropriate use of biological knowledge, concepts, principles and skills in evaluating the roles of various physiological processes in plants and animals.
2. group organisms according to their similarities and differences.
3. demonstrate positive attitudes and responsiveness towards community social values and take measures to protect oneself, family and community.
4. use appropriate skills to solve various health related problems.

CLASS LEVEL OBJECTIVES

By the end of Form three course, the student should be able to:

- a) acquire basic knowledge principles, concepts and skills in evaluating the roles of physiological processes in plants and animals.
- b) apply knowledge and skills of biological science and related fields in improving livestock and crop production.
- c) classify organisms in their respective kingdoms, phylum/division and class.
- d) develop positive attitude, values and practices for enhancing positive gender relations, environmental protection, and sexual and reproductive health.
- e) take appropriate precautions and measures against problems related to reproductive processes in animals and flowering plants.
- f) apply appropriate skills in managing problems related to HIV, AIDS, drug abuse and sexual and reproductive health.

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
1.0 CLASSIFICATION OF LIVING THINGS 1.1 Kingdom Plantae. 1.1.1 Division Coniferales (conifers).	The student should be able to: a) explain general and distinctive features of the division Coniferales.	i) Using guidelines provided, students to collect a variety of plants (or plant parts) under division Coniferales (i.e. pine, cedar, spruce etc) from the surrounding environments. ii) Students in groups to observe the plants collected and those displayed by the teacher and record the observable features of those plants. iii) The teacher to lead a class discussion on the general and distinctive features of the division Coniferales, make clarification and conclusion.	<ul style="list-style-type: none"> • A variety of conifers (pine, cedar, cypress, spruce). • Pictures of conifers e.g. pine, cypress, spruce, cedar. • Pictures of cones (male and female cones). • Charts of conifers. • Cones (fresh or preserved cones). 	Is the student able to explain general and distinctive features of the division Coniferales?	2
	b) describe the structure of Pinus.	i) Using guiding questions, students in groups to observe charts/pictures/ pine tree or its parts and identify the structures. ii) The teacher to lead a class discussion on the structure of a pine tree (Pinus sp). iii) Student to draw and label a pine tree (or plant parts), male and female cones.	<ul style="list-style-type: none"> • A variety of cone bearing plants. • Pictures of conifers (pine tree, cypress, spruce, cedar). • Charts showing different types of cone bearing plants. • Cones (fresh) or preserved. 	Is the student able to describe the structure of a Pinus?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) explain advantages and disadvantages of the division Coniferophyta.	i) The teacher to lead students to discuss on the advantages and disadvantages of plants under the division Coniferophyta. ii) Students to outline advantages and disadvantages of plants under the division Coniferophyta.	<ul style="list-style-type: none"> • A variety of cone bearing plants. • Charts/pictures showing different types cone bearing plants. 	Is the student able to explain advantages and disadvantages of the division Coniferophyta?	
1.1.2 Division Angiospermophyta (Flowering Plants).	The student should be able to: a) explain general and distinctive features of the division Angiospermophyta. b) outline the classes of the division Angiospermophyta.	i) Students in groups to observe a variety of flowering plants and record their observable features. (Observations should base on the structure of roots, leaves, shoots, flowers etc). ii) The teacher to lead a class discussion on general and distinctive features of division on Angiospermophyta makes general comment and conclusion.	<ul style="list-style-type: none"> • Flowers from dicot and monocots. • Fruits and seeds of flowering plants. • A variety of flowering plants. 	Is the student able to explain general and distinctive features of the division Angiospermophyta?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) The teacher to lead a class discussion on the classes and general and distinctive features of each class (Monocotyledonae and Dicotyledonae).	<ul style="list-style-type: none"> • Mature and young bean and maize plants. • Charts showing characteristic of classes of division Angiospermophyta. • Razor blade/knife/ scalpel/ surgical blade. 		
	c) describe structures of representative plants under each class (Monocotyledonae and Dicotyledonae).	i) Using guiding questions, students in groups to observe variety of plants under each class and identify their characteristic features. ii) The teacher to lead a class discussion on the structure of representative plants under each class (maize, millet, rice, groundnuts, bean and pea). iii) Students to draw and label representative plants under each class. A variety of flowering plants.	<ul style="list-style-type: none"> • Razor blade/surgical blade/scalpel. • Maize grains. • Beans/peas seeds. • A variety of seed. 	Is the student able to describe structures of representative plants under each class (Monocotyledonae and Dicotyledonae)?	
	d) explain advantages and disadvantages of division Angiospermophyta.	i) Students to brainstorm on the advantages and disadvantages of kingdom Plantae.	A chart on the representative plants under the division Angiospermophyta.	Is the student able to explain advantages and disadvantages of division Angiospermophyta?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		<p>ii) The teacher to use students' responses and give clarifications and summary on the advantages and disadvantages of the division of the division Angiospermophyta.</p>			
<p>2.0 MOVEMENT 2.1 Concept of Movement and Locomotion.</p>	<p>The student should be able to:</p> <p>a) explain the concepts of movement and locomotion.</p> <p>b) explain the importance of movement in animals and plants.</p>	<p>i) The teacher to guide students to brainstorm on the meaning of movement and locomotion.</p> <p>ii) Students to synthesize their responses and explain the meaning and the differences between movement and locomotion.</p> <p>iii) The teacher to lead a class discussion on the meaning and the differences between the two concepts.</p> <p>i) Using guiding questions, students in groups to discuss the importance of movement in animals and plants.</p> <p>ii) The teacher to guide students to summarize their responses, make general comments and concluding remarks.</p>	<ul style="list-style-type: none"> Variety of organisms such as insects, fish and mouse. Charts on locomotion/ movement of different organisms. 	<p>Is the student able to explain the concepts of movement and locomotion?</p> <p>Is the student able to explain the importance of movement in animals and plants?</p>	<p>4</p>

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) demonstrate movement and locomotion actions .	i) The teacher to design an activity for students in demonstrates movement and locomotion. ii) Students in groups to perform various actions depicting movement and locomotion. iii) The teacher to guide students through questions and answers to give the differences between movement and locomotion.	<ul style="list-style-type: none"> • Pictures/drawings of various organisms depicting movement and locomotion. • Variety of organisms such as insects, fish and mouse. 	Is the student able to demonstrate movement and locomotion actions?	
2.2 Movement of the Human Body. 2.2.1 The Human Skeletal System.	The student should be able to: a) describe the structures of human skeleton. b) explain the functions of the major components of the human skeleton and their adaptations.	i) Students in groups to examine the picture/ model of skeleton and identify its major parts. ii) The teacher to lead a class discussion on the structure of the human skeleton and its major components. iii) Students to draw a well labelled diagram of the structure of human skeleton.	<ul style="list-style-type: none"> • Model of human skeleton. • Diagrams/pictures of the human skeleton. 	Is the student able to describe the structures of human skeleton?	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	ii) The teacher to lead plenary discussion and guide students to summarize and record major points or ideas.				
2.2.2 Muscles and Movement.	The student should be able to: a) explain the concept of muscles. b) mention types of muscles. c) demonstrate how muscles facilitate movement.	i) Students to brainstorm the meaning of muscles. ii) The teacher to synthesize student's responses and use them to get the correct meaning of muscle. i) Students in groups to observe charts/models/pictures of different muscles and identify their differences. ii) The teacher to lead a class discussion on the type of muscles.	Charts/diagrams/pictures of different muscles. Models/charts/pictures/diagrams of different types of muscles.	Is the student able to explain the concept of muscles? Is the student able to mention types of muscles? Is the student able to demonstrate how muscles facilitate movement?	6

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>iii) Students to present their findings and the teacher to lead plenary discussion, guide students to summarize the major points and make conclusion.</p> <p>d) describe the structure of the muscle.</p> <p>e) explain adaptations of different types of muscles.</p>	<p>i) Students in groups to observe pictures/ diagrams/model of muscles (biceps and triceps muscles) and discuss the structure of muscles.</p> <p>ii) The teacher to lead a class discussion on the structures of muscles.</p> <p>iii) Students to draw and label the structure of biceps and triceps muscles during bending and stretching of the arm.</p> <p>i) Students in groups to observe pictures/ diagrams/model of different types of muscle and discuss the adaptation of different types of muscles to their roles.</p>	<ul style="list-style-type: none"> • Charts/diagrams/ models of different muscles. • Real objects. <p>Models/pictures/diagrams of muscles.</p>	<p>Is the student able to describe the structures of the muscle?</p> <p>Is the student able to explain adaptations of different types of muscles?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) The teacher to lead a class discussion and summarize the major points on the adaptation of different types of muscles to their roles.</p>	<p>i) Students in groups to discuss causes, effects and preventive measures of muscle cramps. ii) The teacher to lead class discussion and make any necessary clarifications.</p>	<p>Models/pictures/diagrams of different types of muscles.</p>	<p>Is the student able to explain causes, effects and preventive measures of muscle cramps?</p>	
1.3 Movement in Plants.	<p>The student should be able to:</p> <p>a) explain the concept of movement in plants (movement of curvature).</p>	<p>i) Students to observe plants/potted plants showing movement in plants and record the finding. ii) Students in groups to discuss movement exhibited by plant and their importance and present their task for plenary discussion. iii) The teacher to lead plenary discussion and make clarification and conclusion on the meaning and importance of movement exhibited by plants.</p>	<ul style="list-style-type: none"> • Photograph, diagrams and charts showing movement in plants. • Plants showing movement of curvature. 	<p>Is the student able to explain the concept of movement in plants?</p>	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) mention types of movement exhibited by plants.	i) Students to observe plants showing different types of movement and record the findings. ii) The teacher to lead a class discussion on the types of movement exhibited by plants (i.e. Nastic and Tropism).	<ul style="list-style-type: none"> • A variety of plants showing movement exhibited by plants. • Charts/diagrams/pictures showing nastic and tropic responses in plant. 	Is the student able to mention types of movement exhibited by plants?	
	c) carry out experiments to investigate movement in plants.	i) Students in groups using guidelines to perform experiments to investigate movement exhibited by plants and record their findings. ii) Students to present their findings and the teacher to lead class discussion, make clarification and conclusion.	<ul style="list-style-type: none"> • Potted plants. • Charts, photograph, diagrams and pictures depicting movement in plants. • Young potted plants. 	Is the student able to investigate movement in plants?	
3.0 COORDINATION 3.1 Concept of Coordination.	The student should be able to: a) explain the concept of coordination in organisms.	i) The teacher to guide students in groups to discuss meaning and importance of coordination in organisms. ii) Student to present group tasks and the teacher to lead plenary discussion, make necessary clarifications and conclusion.	<ul style="list-style-type: none"> • Hot objects. • Sharp objects. • Live specimens or toys of insects and small mammals. 	Is the student able to explain the concept of coordination in organisms?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) outline ways in which coordination is brought about.	i) Students to observe charts/ diagrams/ pictures showing main components of nervous coordination and discuss the role of each components, stimulus, receptors, coordinator, effectors and response. ii) Students to discuss in groups on the ways in which coordination is brought about. iii) The teacher to lead a class discussion on the ways in which coordination is brought about.	<ul style="list-style-type: none"> • Chart to show how coordination is brought about. • Hot object. • Sharp object. • Real objects. • Game or puzzle chart on nervous coordination process. 	Is the student able to outline ways in which coordination is brought about?	
3.2 Nervous Coordination in Human. 3.2.1 Neurones.	The student should be able to: a) describe the structure of motor, sensory and relay neurones. b) explain the roles of motor, sensory and relay neurones.	i) The teacher to lead a class discussion on the structures of motor, sensory and relay neurones. ii) Students to draw and label diagram to show the structure of motor, sensory and relay neurones.	<ul style="list-style-type: none"> • Models/pictures/ photographs of neurones. • Prepared slides of neurones. • Microscope. 	Is the student able to describe the structure of motor, sensory and relay neurones?	1
		i) Students to discuss in group the roles of motor, sensory and relay neurone and to present their responses for plenary discussion.	A chart showing summary of the roles of motor, sensory and relay neurones.	Is the student able to explain the roles of motor, sensory and relay neurones?	

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3.2.2 Central Nervous System (CNS).	<p>The student should be able to:</p> <p>a) give the meaning of Central Nervous System (CNS).</p> <p>b) identify the components of the central nervous system and their functions.</p> <p>c) describe the structures of the spinal cord and brain.</p>	<p>ii) The teacher to summarize students responses, make general comment and necessary corrections.</p> <p>i) Students to brainstorm on the meaning of CNS.</p> <p>ii) The teacher to summarize students' responses and give general comments and conclusion.</p> <p>i) Students to observe models charts/diagrams/ photographs of brain and spinal cord and identify their components.</p> <p>ii) The teacher to guide students in groups to identify the components of the central nervous system and discuss their roles.</p> <p>i) The teacher to guide students in groups to observe models/ diagram/ pictures of the spinal cord and brain and discuss their structures.</p> <p>ii) Students to draw and label the structures of the spinal cord and brain.</p>	<ul style="list-style-type: none"> • Charts of the Central Nervous System. • Hand lenses. • Pictures/photographs of brain and spinal cord. <ul style="list-style-type: none"> • Charts/diagrams of CNS. • Diagrams/models of brain and spinal cord. <ul style="list-style-type: none"> • Diagrams and photographs of the spinal cord. • Models of the brain and spinal cord. 	<p>Is the student able to give the meaning of Central Nervous System?</p> <p>Is the student able to identify the components of the central nervous system and their functions?</p> <p>Is the student able to describe the structures of the brain and spinal cord?</p>	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
3.2.3 Peripheral Nervous System (PNS).	<p>The student should be able to:</p> <p>a) give the meaning of Peripheral Nervous System.</p> <p>b) identify the components of the Peripheral Nervous System and their functions.</p>	<p>i) Students to brainstorm on the meaning of Peripheral Nervous System.</p> <p>ii) The teacher to guide students to summarize and record correct responses and make clarification and conclusion.</p> <p>i) Students to observe charts, photographs/specimens of mice/rabbit/frog to identify the components of the PNS.</p> <p>ii) The teacher to lead a class discussion on the components of the peripheral nervous systems.</p>	<p>Photographs/charts showing the structures of PNS.</p> <ul style="list-style-type: none"> • Charts/photographs/pictures on peripheral Nervous systems. • Preserved specimen of frog mouse/rabbit showing the PNS. 	<p>Is the student able to give the meaning of Peripheral Nervous system and their functions?</p> <p>Is the student able to identify components of Peripheral Nervous System?</p>	2
3.2.4 Reflex Action.	<p>The student should be able to:</p> <p>a) give the meaning of reflex action.</p> <p>b) describe the neuron pathway of a reflex action.</p>	<p>i) The teacher to design activities for student to demonstrate the reflex action.</p> <p>ii) Students in groups to demonstrate the reflex action and record their findings.</p> <p>iii) The teacher to lead students to discuss the meaning of reflex action.</p>	<ul style="list-style-type: none"> • Hot objects. • Live specimens of insects or small mammals. • Toys (snake, scorpion). <p>Charts/photographs/diagrams showing neuron pathways of a reflex action.</p>	<p>Is the student able to give the meaning of reflex action?</p> <p>Is the student able to describe the neuron pathway of a reflex action?</p>	6

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>i) The teacher to display the chart/diagrams/ photographs showing the neuronc pathway of a reflex action for students to observe and identify the components of the neuronc pathway of reflex action.</p> <p>ii) Students to draw and label the neuronc pathway of reflex action.</p> <p>iii) The teacher to lead a class discussion on the neuronc pathway of a reflex action.</p>	<p>i) The teacher to design activities for student to demonstrate simple reflex and conditioned reflex actions.</p> <p>ii) Students in groups to demonstrate simple reflex actions and conditioned reflex actions and record their findings.</p> <p>iii) The teacher to lead a class discussion on the differences between simple reflex action and conditioned reflex action.</p>	<ul style="list-style-type: none"> • Charts/diagrams of simple conditioned reflex actions. • Bell. • Video/radio tapes showing simple and conditioned reflex action. 	<p>Is the student able to differentiate simple reflex from conditioned reflex action?</p>	
<p>b) distinguish simple reflex from conditioned reflex action.</p>					

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3.2.5 Sense Organs.	The student should be able to: a) explain the meaning of a sense organ.	i) Students in groups to observe models/ pictures/diagram/ charts and brainstorm on the meaning of sense organ. ii) Students to present their group responses in plenary session and the teacher to guide them to record the correct responses and make general comments and conclusion.	<ul style="list-style-type: none"> • Charts of different sense organs.. • Pictures/diagrams/ Models of sense organs. 	Is the student able to explain the meaning of sense organ?	6
	b) identify types of sense organs and their relative position.	i) Students to observe models/ pictures/ diagrams/charts of mouse (or any other small mammal) and identify sense organs and their relative position. ii) Using guiding questions, students in groups to observe charts/models/ specimens of different sense organs and identify its parts. iii) The teacher to lead a class discussion on the types of sense organs and their relative positions.	<ul style="list-style-type: none"> • Models/charts showing the structure of sense organs. • Mirror. • Small mammals such mouse. 	Is the student able to identify types of sense organs and their relative position?	
	c) describe the structure of each sense organ.	i) The teacher to lead students to discuss in groups the structure of each sense organ.	<ul style="list-style-type: none"> • Small mammal. • Models/charts of different sense organs. 	Is the student able to describe the structure of each sense organ?	6

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	ii) Students to draw and label the human ear, eye, nose the tongue (to show the location of taste buds) and the transverse section (T.S) of the skin.				
	d) explain the functions of sense organs and their adaptive features.	i) Students in groups to observe models/pictures/specimens showing different sense organs and discuss the role of each sense organ and its adaptive features. ii) Students to present their group task and the teacher to guide them to summarize major points and make clarification.	<ul style="list-style-type: none"> Charts/models/ photographs of different sense organs. Live or preserved specimen. 	Is the student able to explain the functions of sense organ and their adaptive features?	
3.3 Drugs and Drug Abuse in Relation to Nervous Coordination.	The student should be able to: a) explain the meaning of drugs and drug abuse in relation to nervous coordination. b) outline proper ways of handling and using drugs.	i) The teacher to lead the students to discuss in groups the meaning of drugs and drug abuse in relation to nervous coordination. ii) The teacher to summarize group responses, give necessary corrections and make conclusion.	<ul style="list-style-type: none"> Video/film on effects of drug and substance abuse. Samples of drugs. 	Is the student able to explain the meaning of drugs and drug abuse in relation to nervous coordination?	6
	b) outline proper ways of handling and using drugs.	i) Students in groups to discuss proper ways of handling and using drugs.	<ul style="list-style-type: none"> Video/film. Pictures and posters of illegal drug users and addicts. 	Is the student able to outline proper ways of handling and using drugs?	

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	<p>ii) The teacher to guide students to make clarification and conclusion on proper ways of handling and using drugs.</p> <p>i) The teacher to invite a drug abuse control expert or health officer/practitioner to talk on drug addiction, its causes and effects.</p> <p>ii) Students to summarize major points from the guest speaker presentation and the teacher to guide them to clarify major issues and make conclusion.</p> <p>iii) Students to do a project on cases of drug addiction in their surrounding community.</p>	<p>i) The teacher to invite a drug abuse control expert or health officer/practitioner to talk on drug addiction, its causes and effects.</p> <p>ii) Students to summarize major points from the guest speaker presentation and the teacher to guide them to clarify major issues and make conclusion.</p> <p>iii) Students to do a project on cases of drug addiction in their surrounding community.</p>	<ul style="list-style-type: none"> • Samples of drugs. • Video/film showing proper ways of handling and using drugs. • Brochure and fliers on causes and effects of drug addiction. • Video/film showing people affected by drugs. 	<p>Is the student able to explain causes and effects of drug addiction?</p>	
	<p>c) explain causes and effects of drug addiction.</p> <p>d) suggest preventive and control measures of drug abuse.</p>	<p>i) Students in groups to discuss the preventive and control measures of drug abuse.</p> <p>ii) The teacher to use students correct responses and give clarifications and conclusion.</p>	<ul style="list-style-type: none"> • Video/film about drug and substance abuse. • Posters of drug addicts/users. 	<p>Is the student able to suggest preventive and control measures of drug abuse?</p>	

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		iii) Students to make a study visit in a nearby health centre/hospital and collect data of causes and effects of drug abuse and measures taken by health department to prevent and control drug abuse in the community.			
3.4 Endocrine glands.	The student should be able to: a) identify location of different endocrine glands in the mammalian body.	i) The teacher to lead a class discussion on the location of the endocrine glands in the mammalian body and the types of hormones produced by each gland. ii) Students to draw the diagram to show location of endocrine glands in human body. iii) The teacher to lead class discussion on the differences between endocrine and exocrine gland.	<ul style="list-style-type: none"> Charts/or diagrams of endocrine glands and hormones produced by each gland. Diagrams/models/pictures showing the position of the endocrine glands in a mammalian body. 	Is the student able to identify location of different endocrine glands in the mammalian body?	6
	b) explain the role of hormones produced by each endocrine gland.	i) Students in groups to discuss the role of each hormone in the mammalian body. ii) The teacher to use students responses to make clarifications and conclusion.	Charts of the endocrine glands.	Is the student able to explain the role of hormones produced by each endocrine gland?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) outline disorders of hormonal coordination in mammals.	i) Students in groups to discuss the disorders of hormonal coordination in mammals. ii) The teacher to lead a class discussion on the disorders of hormonal coordination due to hyper-and hypo-secretion of insulin, growth hormone, antidiuretic hormone and thyroxin.	Pictures/photographs of disorders of hormonal coordination e.g. goitre, gigantism and dwarfism.	Is the student able to outline disorders of hormonal coordination in mammals?	
3.5 Coordination in Plants. 3.5.1 Concept of Tropic and Nastic Responses.	The student should be able to: a) explain the concepts of tropic and nastic responses. b) carry out experiments to investigate the effects of tropic and nastic responses in plants.	i) Students to observe potted plants grown in all round light and unilateral light and record their observations. ii) Using question and answers, the teacher to guide students to give the meaning of tropic and nastic responses. i) Students using guidelines to carry out experiments to investigate the effects of tropic and nastic in plants and record their findings. ii) The teacher to lead class discussion, make clarification on misconceptions and make conclusion.	<ul style="list-style-type: none"> • Potted plants. • Charts/photographs/ or pictures of tropic responses of shoots and roots. • Young plant. • Mimosa plant. <ul style="list-style-type: none"> • Potted plants. • Beakers. • Cotton wool. • Bean or maize seeds. • Young plant. • Mimosa plants. 	Is the student able to explain the concepts of tropic and nastic responses? Is the student able to investigate the effects of tropic and nastic responses in plants?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) explain the importance of tropic and nastic responses.	i) Students in groups to discuss the importance of hydro-geo- photo and chemotropisms in plants. ii) The teacher to lead plenary discussion, make general comments and conclusion on the significance of tropisms and nastic responses in plants. iii) Students to outline significance of tropisms in plant growth.	<ul style="list-style-type: none"> Potted plants subjects to all round light and unidirectional light. Charts to show examples of tropic responses. 	Is the student able to explain the importance of tropic and nastic responses?	
4.0 EXCRETION 4.1 Concept of Excretion.	The student should be able to: a) explain the concept of excretion. b) give examples of excretory products eliminated by organisms.	i) Students in groups to discuss the meaning and importance of excretion. ii) The teacher to guide students to categorize their responses and record the major points. i) Using questions and answers the teacher to lead student to name excretory products eliminated by organisms. ii) The teacher to lead a plenary discussion and guide students to summarize major ideas on the excretory products eliminated by organisms.	<ul style="list-style-type: none"> Models of kidney. Preserved specimen of kidney. Diagrams/charts of excretory system. 	Is the student able to explain the concept of excretion? Is the student able to give examples of excretory products eliminated by animals?	2

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4.2 Excretion in Human.	The student should be able to: a) mention excretory organs in human being.	i) Students in groups to observe charts/pictures/models showing different excretory organs and identify their differences. ii) The teacher to lead students to discuss on the types of excretory organism in human.	Model/chart/diagram of excretory organs.	Is the student able to mention excretory organs in human being?	4
	b) describe the urinary system.	i) The teacher to dissect a mouse or any other small mammal to display the urinary system. ii) Using guiding questions students to observe models/ diagram/pictures showing the human urinary system and identify the structures (kidney, ureter, urinary balder). iii) The teacher to lead students to discuss the structure of urinary system and its adaptive features. iv) Students to draw and label the structure of the human excretory system (Kidney, ureter, urinary bladder, urethra).	<ul style="list-style-type: none"> • Models/charts/diagram/pictures/specimens showing the human urinary system. • Dissecting kits and trays. • Chloroform. • Cotton. 	Is the student able to describe the urinary system?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) explain the process of urine formation.	i) The teacher to guide students to brainstorm on the process of urine formation. ii) Students to discuss in groups the process of urine formation and the teacher to make clarifications.	Models/charts/pictures showing the urinary system.	Is the student able to explain the process of urine formation?	
4.3 Complications and Disorders of the Excretory System.	The student should be able to: a) mention common complications and disorders of the excretory system. b) explain the causes, symptoms, effects and control measures of common complications and disorders of the excretory system.	i) The teacher to prepare case studies on common complications and disorders of the excretory system e.g. kidney stones and kidney failure. ii) Students in groups to discuss the cases using guiding questions given by the teacher. iii) The teacher to lead plenary discussion and guide students to summarize key ideas.	Charts/diagram of the urinary system and the associated disorders and complications. • A chart showing the tabulation of causes, symptoms, and effects control of the complications and disorders of the excretory system. • Charts/models/pictures showing urinary system.	Is the student able to mention common complications and disorders of the excretory system? Is the student able to explain causes, symptoms and effects and control measures of common complications and disorders of the excretory system?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
4.4 Excretion in Plants.	The student should be able to: a) mention types of excretory products eliminated by plants.	<p>ii) The teacher to invite a health officer to talk on complications and disorders of the excretory system (kidney failure and kidney stones).</p> <p>iii) Students to summarize major points from the guest speaker presentation and the teacher to guide them to clarify major issues and make conclusion.</p>	A chart showing various plants and their excretory products.	Is the student able to mention types of excretory products eliminated by plants?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
5.0 REGULATION 5.1 Concept of Regulation.	b) explain the importance of common excretory products of plants.	i) The teacher to lead students in groups to discuss the importance of excretory products of plants such as gum, alkaloids and latex. ii) Teacher to lead plenary discussion on the importance of excretory products from plants, summarize the major points and make conclusion.	<ul style="list-style-type: none"> • A chart showing various plants and their waste products. • Samples of plant excretory products such as gums, alkaloids and latex. 	Is the student able to explain the importance of excretory products of plants?	
	The student should be able to: a) explain the concept of regulation.	i) The teacher to guide students in groups to discuss the meaning of regulation and its importance. ii) The teacher to lead plenary discussion and make clarification and conclusion on the concept of regulation and its importance.	A chart showing the process of regulation in animals.	Is the student able to explain the concept of regulation?	2
	b) mention various types of regulation.	i) Students in groups to observe charts/pictures showing the process of regulation in animals and identify their differences. ii) The teacher to lead a class discussion on the types of regulation, temperature of regulation, regulation of water and mineral salts in animals.	<ul style="list-style-type: none"> • Extracts/texts on various types of regulation. • Charts/pictures/ diagrams showing various types of regulation. 	Is the student able to mention types of regulation?	

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5.2 Temperature Regulation in Animals.	<p>The student should be able to:</p> <p>a) explain the concept of temperature regulation in animals.</p>	<p>i) Students in groups using guidelines to perform experiments to determine the temperature of a frog/toad and a small mammal under different conditions (cold and hot) and record their findings.</p> <p>ii) Students to divide the experimental animals into ectotherms and endotherms.</p> <p>iii) The teacher to lead plenary discussion and guide students to clear out misconception and make conclusion.</p>	<ul style="list-style-type: none"> • Toad/frog. • Small mammal (rat, mouse, rabbit). • A clinical thermometer. 	<p>Is the student able to explain the concept of temperature regulation in animals?</p>	6
	<p>b) carry out practical activities to determine temperature regulation in mammals.</p>	<p>i) Students in pairs, to carry out practical exercises on measuring body temperatures and record changes in body temperature before and after performing a physical exercise.</p> <p>ii) Students to report their findings and the teacher to lead class discussion on the temperature regulation in mammals and make clarification.</p>	<ul style="list-style-type: none"> • A clinical thermometer. • A chart showing a table for recording body temperature. • Small mammals e.g. mouse or rabbit. 	<p>Is the student able to carry out practical activities to determine temperature regulation in mammals?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) describe the mechanism of temperature regulation in mammals.	i) Students to discuss in groups the body reactions when the temperature of the surrounding is lower and when is higher than the body temperature. ii) The teacher to lead a class discussion on the structure of the skin in relation to temperature regulation (vasoconstriction and vasodilation). iii) Students to draw and label section of the skin showing vasoconstriction and vasodilation.	<ul style="list-style-type: none"> Models/charts/ photographs showing the section of the skin. Pictures/diagrams showing the reaction of the skin under different conditions (hot and cold). 	Is the student able to describe the mechanism of temperature regulation in mammals?	
5.3 Osmoregulation in Mammals.	The student should be able to: a) explain the concept of osmoregulation.	i) Students to discuss in groups on the meaning of osmoregulation and its importance. ii) The teacher to make clarifications and conclusion on the meaning of osmoregulation and its importance.	Charts, pictures, photographs or diagrams showing osmoregulation in mammals.	Is the student able to explain the concept osmoregulations?	4
	b) mention factors which affect the contents of salt and water in the body.	i) The teacher to guide students through questions and answers to mention factors which may affect the contents of salt and water in the body.	<ul style="list-style-type: none"> Charts, pictures or diagrams showing osmoregulation in mammals. Models/charts/ pictures showing the structure of a nephron. 	Is the student able to mention factors which affect the contents of salt and water content in the body?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
5.4 Blood Sugar Regulation in Mammals.	The student should be able to: a) explain the mechanisms of regulating sugar level in the blood. b) outline the causes, symptoms and effects of high and low sugar levels in the blood.	ii) The teacher to guide students in groups to affect the salt and water content in the body. iii) Students to present their group tasks and the teacher to lead plenary discussion and give correction where necessary. i) Students in group to discuss how hormones regulate sugar levels in the blood (insulin and glucagons). ii) Students to present their tasks in a plenary discussion.	Pictures, charts or photographs showing the mechanisms of regulating sugar level in the blood.	Is the student able to explain the mechanisms of regulating sugar level in the blood?	4
6.0 REPRODUCTION 6.1 Concept of Reproduction.	The student should be able to: a) explain the concept of reproduction.	The teacher to assign tasks to students in groups to read literatures and outline the causes, symptoms and effects of high and low sugar levels in the blood. i) The teacher to guide students to discuss the meaning and importance of reproduction. ii) The teacher to summarize students' responses and make necessary clarification and give conclusion.	Video tapes, charts, and pictures showing the causes, symptoms and effects of high and low sugar levels in the blood. • Flip charts. • V.I.P.P. cards carrying key messages on reproduction.	Is the student able to outline the effects of high and low sugar level in the blood? Is the student able to explain the concept of reproduction?	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) distinguish between sexual and asexual reproduction.	i) The teacher to display variety of organisms which reproduce by seeds or vegetative. ii) Students to observe a variety of organisms displayed and discuss in groups the ways in which the plants reproduce whether by means of asexual or sexual reproduction. iii) Students in their group to discuss the differences between asexual and sexual reproduction and present their group tasks for plenary discussion. iv) The teacher to lead plenary discussion, make general comments and conclusion.	<ul style="list-style-type: none"> • Variety of organisms. • Picture/photographs of plants that reproduce by seeds or vegetative. 	Is the student able to distinguish between sexual and asexual reproduction?	
	c) explain the merits and demerits of sexual and asexual reproduction.	i) Students in groups to observe variety of plants which reproduce asexually and sexually. ii) Students in groups to discuss the merits and demerits of asexual and sexual reproduction. iii) Students to present their tasks for plenary discussion.	<ul style="list-style-type: none"> • Variety of organisms. • Picture/photographs of plants that reproduce asexually and sexually. 	Is the student able to explain the merits and demerits of sexual and asexual reproduction?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
6.2 Meiosis and Reproduction.	<p>The student should be able to:</p> <p>a) give the meaning of meiosis.</p> <p>b) explain the significance of meiosis in relation to reproduction.</p> <p>c) carry out an experiment to show stages of meiosis process.</p>	<p>i) The teacher to guide the students to brainstorm the meaning of meiosis using charts/photographs and models showing stages of meiosis.</p> <p>ii) Students to synthesize and correct responses.</p> <p>iii) The teacher to summarize the student responses and make conclusion.</p> <p>i) Using charts/photograph and models, students to observe the events which take place in different stages of meiosis.</p> <p>ii) The teacher to lead class discussion on the significance of meiosis in relation to reproduction and summarize the main ideas.</p> <p>i) Using charts/photograph and models, students to observe the events which take place in different stages of meiosis.</p> <p>ii) The teacher to lead class discussion on the significance of meiosis in relation to reproduction and summarize the main ideas.</p> <p>i) Using charts/photograph and models, students to observe the events which take place in different stages of meiosis.</p> <p>ii) The teacher to display charts/ photographs/ diagrams showing the events taking place in each stage of meiosis process.</p>	<p>Charts/photographs showing stages of meiosis.</p> <ul style="list-style-type: none"> • Charts/photographs showing stages of meiosis. • Models showing stages of meiosis. <ul style="list-style-type: none"> • Prepare microscope slide on stages of meiosis. • Microscope. • Charts/photographs/ models showing stages of meiosis. 	<p>Is the student able to give the meaning of meiosis?</p> <p>Is the student able to explain the significance of meiosis in relation to reproduction?</p> <p>Is the student able to carry out experiments to show stages of meiosis?</p>	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
6.3 Reproduction in Flowering Plants. 6.3.1 The Structure of the Flower.	The student should be able to: a) describe the structure of the flower.	iii) Students in groups to observe the displayed model chart, photographs or diagrams and outline the events taking place at each stage of meiosis and record their findings. i) Students using guidelines to collect variety of flowers. ii) Students in groups to observe the collected flowers and identify different parts of the flower and describe their structures. iii) The teacher to lead plenary discussion and make clarifications and conclusion on the structure of the flower. iv) Students to draw a well labelled diagram of the named flower.	<ul style="list-style-type: none"> • Variety of flowers. • Charts/models/ photographs of flowers. 	Is the student able to describe the structure of the flowers?	2
	b) identify reproductive parts of the flower.	i) Students in groups to observe variety of flowers and identify the reproductive parts. ii) The teacher to lead students to identify and discuss the reproductive parts of the flower.	<ul style="list-style-type: none"> • Variety of flowers. • Models/charts/ pictures showing different types of flowers. 	Is the student able to identify reproductive parts of the flower?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
6.3.2 Pollination.	<p>The student should be able to:</p> <p>a) explain the meaning of pollination.</p> <p>b) identify types of pollination.</p> <p>c) outline agents of pollination.</p>	<p>i) Students to brainstorm on the meaning of pollination.</p> <p>ii) The teacher to lead a class discussion on the meaning of pollination and its importance.</p> <p>i) The teacher to design a study visit around the school environment/school garden for students to observe different flowers and identify types of pollination (self and cross pollination).</p> <p>ii) Using guiding question students in groups to discuss ways in which the two types of flowers are pollinated and present their finding in plenary discussion.</p> <p>iii) The teacher to lead plenary discussion and guide students to summarize their findings and make conclusion.</p> <p>i) The teacher to guide the student to observe the characteristics of flowers (in terms of colour of petals, structure of stigma, styles, presence of absence of nectar.</p>	<ul style="list-style-type: none"> • Variety of flowers. • Models/charts/ photographs of pollination of the flowers. • Variety of flowers. • Diagrams, pictures and models of different flowers. 	<p>Is the student able to explain the meaning of pollination?</p> <p>Is the student able to identify types of pollination?</p> <p>Is the student able to outline the agents of pollination?</p>	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
6.3.3 Fertilization.	<p>The student should be able to:</p> <p>a) explain the concept of fertilization.</p> <p>b) explain the process of fertilization in flowering plants.</p>	<p>ii) Basing on these characteristics student to suggest agencies of pollination for different types of flowers.</p> <p>iii) The teacher to record the suggestions/points given by students and make necessary clarification and conclusion on different types of flowers and their agents of pollination (wind and insect pollinated flowers).</p>	<ul style="list-style-type: none"> Variety of flowers e.g. flowers of hibiscus, common bean, rose, maize, millet and grass. Pictures/diagrams showing insects/small birds pollinating a flower. 	<p>Is the student able to explain the concept of fertilization?</p>	4
		<p>i) The teacher to guide students to discuss on the meaning of fertilization in flowering plants.</p> <p>ii) The teacher to guide students to summarize their responses, make general comments and conclusion on the meaning of fertilization.</p> <p>Students to discuss in groups the process of fertilization in flowering plants and present their group tasks for plenary discussion.</p>	<ul style="list-style-type: none"> Models/diagrams/charts showing the process of fertilization in flowering plants. Variety of flowers. Charts/models/ photographs showing the process of fertilization in flowering plants. Variety of flowers. 	<p>Is the student able to explain the process of fertilization in flowering plants?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
6.4 Reproduction in Mammals.	The student should be able to: a) identify parts of the male and female reproductive organs.	Students in groups to identify male and female reproductive organs from the dissected mice/any other small mammal.	<ul style="list-style-type: none"> • Mouse/any other small mammal. • Dissecting kit. • Tray/dissecting board. • Chloroform. • Cotton wool. • Water. 	Is the student able to identify parts of the male and female reproductive organs?	4
	b) describe male and female reproductive systems.	i) Students in groups to observe the dissected mammal/models/ charts/ pictures showing male and female reproductive systems and identify the structures. ii) The teacher to lead class discussion and make correction and clarification on the structures of the male and female reproductive systems. iii) Students to draw and label diagrams of male and female reproductive systems of a mammal.	<ul style="list-style-type: none"> • Models of dissected mice. • Pictures, photograph and charts showing structures of male and female reproductive system. • Dissected mice or any other small mammal. 	Is the student able to describe male and female reproductive systems?	
6.4.1 Gamete Formation and Fertilization.	The student should be able to: a) outline the process of gamete formation in mammals.	i) Through question and answers the teacher to guide students to discuss the process of gamete formation in mammals. ii) Students in groups to discuss the process of gamete formation in mammals.	Pictures/charts showing formation and liberation of gametes.	Is the student able to outline the process of gamete formation in mammals?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>iii) The teacher to lead plenary discussion on gamete formation, liberation.</p> <p>b) explain the processes of ovulation and menstruation.</p>	<p>i) Using illustrations/graphs, the teacher to guide the student to identify the phases of menstrual cycle and events that take place in each phase.</p> <p>ii) Students in groups to discuss the process of ovulation and hormones involved in the process.</p> <p>iii) The teacher to lead plenary discussion and give comments and clarification on the process of ovulation and menstruation in groups.</p>	<p>Charts/graphs showing phase of menstrual and ovarian cycle.</p>	<p>Is the student able to explain the process of ovulation and menstruation?</p>	
	<p>c) explain the process of fertilization, pregnancy and child birth.</p>	<p>i) The teacher to guide students to discuss the process of fertilization pregnancy and child birth.</p> <p>ii) Students in groups to observe charts/models/pictures showing process of fertilization in mammals and present their finding in plenary discussion.</p>	<p>Charts on fertilization process.</p>	<p>Is the student able to explain the process of fertilization, pregnancy and child birth?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>d) outline factors which may hinder fertilization.</p>	<p>i) Students to discuss in groups the factors affecting fertilization and present their group tasks for plenary discussion. ii) The teacher to lead plenary discussion and clarify students responses.</p>	<p>Pictures showing various contraceptives.</p>	<p>Is the student able to outline factors which may hinder fertilization?</p>	
	<p>e) explain the concept of artificial insemination.</p>	<p>i) The teacher to lead students to discuss on the meaning and importance of artificial insemination. ii) The teacher to guide students to summarize the major responses and make general comments.</p>	<p>Charts/drawing depicting artificial insemination.</p>	<p>Is the student able to explain the concept of artificial insemination?</p>	
<p>6.4.2 Multiple Pregnancies.</p>	<p>The student should be able to: a) give the meaning of multiple pregnancies.</p>	<p>i) Students to discuss in groups using guiding questions the causes of multiple pregnancies and present their task for plenary discussion. ii) The teacher to lead plenary discussion and make appropriate comments on the students responses.</p>	<p>Charts/pictures/photographs showing multiple pregnancies cases.</p>	<p>Is the student able to explain the meaning of multiple pregnancies?</p>	<p>2</p>
	<p>b) differentiate between identical twins and fraternal twins.</p>	<p>i) Students to observe the diagrams/ photographs/ pictures showing identical and fraternal twins and suggest the differences between identical and fraternal twins.</p>	<ul style="list-style-type: none"> Charts/diagrams or pictures showing identical and fraternal twins. 	<p>Is the student able to differentiate between identical twins and fraternal twins?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) The teacher to lead a class discussion and summarize the major points on differences between identical and fraternal twins.	<ul style="list-style-type: none"> Diagram/pictures showing fertilization which lead to either identical and fraternal twins. 		
6.5 Disorders of Reproductive System.	The student should be able to: a) mention types of disorders of human reproductive systems.	i) Students in groups to discuss types of disorders of the human reproductive systems. ii) The teacher to lead plenary discussion and make clarification and conclusion.	Documents on the disorders of the human reproductive system.	Is the student able to mention types of the disorders of the human reproductive systems?	6
	b) explain the causes and effects of the reproductive system disorders.	i) Using guiding questions, students in groups to discuss the causes and effects of the reproductive system disorders. ii) The teacher to invite a health officer from the nearby hospital/health centre to talk on the causes and effects of the reproductive system disorders. iii) Students to summarize major points from the guest speaker and the teacher to guide them by clarifying major points.	<ul style="list-style-type: none"> Documents on the disorders of reproductive system. Manila sheet showing the tabulation of causes and effects of the reproductive system disorders. 	Is the student able to explain the causes and effects of the reproductive system disorders?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) suggests possible remedies of reproductive system disorder.	i) The teacher to lead class discussion on the possible remedies of reproductive systems disorder. ii) Students to summarize major points on the possible remedies of reproductive system disorders.	<ul style="list-style-type: none"> • Documents on the disorders of reproductive system. • A chart showing causes and effects of disorders of the human reproductive system. 	Is the student able to suggest possible remedies of reproductive system disorders?	
6.6 Complication of the Reproductive System.	The student should be able to: a) mention types of complications of the reproductive systems. b) outline causes of complications of the reproductive system.	i) The teacher to guide students to brainstorm on the types of complications of the reproductive systems. ii) Students to synthesise their responses and the teacher to guide them to summarize the major points on the meaning of abortion, still births, miscarriage and ectopic pregnancy. i) The teacher to guide students to investigate the causes and effects of complications of the reproductive system. ii) Students to visit local health facility to investigate causes and effects of complications of reproductive system.	<ul style="list-style-type: none"> • Charts/pictures/ photographs showing complications of reproductive system. • Video tapes. • Texts on case studies on complications of the reproductive system. 	Is the student able to mention types of complications of the reproductive systems? Is the student able to outline causes of complications of the reproductive system?	6

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		<p>iii) The teacher to lead students to summarize their finding and make conclusion on the complications of the reproductive system.</p>			
	<p>c) suggest ways to minimize the occurrence of complications and disorders of the reproductive system.</p>	<p>i) The teacher to guide students to discuss in groups ways of minimizing complications and disorders of the reproductive system. ii) Students to present their work in plenary discussion and the teacher to guide them in making any necessary corrections.</p>	<ul style="list-style-type: none"> • Video tapes. • Charts, pictures and photographs showing complications of reproductive system. • Brochures and fliers. • Models showing the reproductive system. 	<p>Is the student able to suggest ways of minimizing the occurrence of complications and disorders of the reproductive system?</p>	
6.7 Sexuality and Sexual Health and Responsible Sexual Behaviour.	<p>The student should be able to:</p> <p>a) explain the concept of sexuality.</p>	<p>i) Students to discuss the meaning sexual, sexual health and sexual behaviour. ii) The teacher to organize the students responses and use them to lead a discussion on the meaning of sexuality, sexual health and responsible sexual behaviour.</p>	<p>Pictures, charts and photographs, video tapes depicting cases of sexuality and sexual behaviours.</p>	<p>Is the student able to explain the concept of sexuality?</p>	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>b) mention social cultural factors influencing sexual behaviour in different age groups of people.</p>	<p>i) The teacher to assign group tasks to students to discuss factors influencing sexual behaviour in different age groups of people. ii) Students to present group tasks for plenary discussion and the teacher to guide them to make any necessary corrections and clarifications.</p>	<p>Pictures, charts, photographs, brochures, fliers, Radio/Video tapes and texts depicting cases of sexuality and sexual behaviour.</p>	<p>Is the student able to mention factors influencing sexual behaviour in different age groups of people?</p>	
	<p>c) differentiate responsible from irresponsible sexual behaviour and their impact on oneself family and community.</p>	<p>i) Students using guidelines to role play on responsible and irresponsible sexual behaviour. ii) The teacher to guide students to discuss responsible and irresponsible sexual behaviour and their impact on oneself, family and community as shown in the role play and make conclusions. iii) Students to tabulate the differences between responsible and irresponsible sexual behaviour.</p>	<ul style="list-style-type: none"> • Radio/Video tapes. • Texts depicting cases of sexuality and sexual behaviour tapes, pictures and photographs showing people with different sexual behaviour (responsible and irresponsible behaviour). 	<p>Is the student able to differentiate responsible from irresponsible sexual behaviour and their impact on oneself family and community?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>d) suggest ways of eradicating irresponsible sexual behaviours/practices in the family and community.</p>	<p>i) The teacher to guide students using questions and answers to outline ways of eradicating irresponsible sexual behaviour in the family, school and community. ii) The teacher to guide students to summarise the major ideas and points on the ways of eradicating irresponsible sexual behaviour and practices.</p>	<ul style="list-style-type: none"> • Radio/Video tapes, cassettes pictures and charts showing people with different sexual behaviour. • Texts depicting cases of different sexual behaviour. • Texts depicting cases of sexuality and sexual behaviour. • Pictorial charts. 	<p>Is the student able to suggest ways of eradicating irresponsible sexual behaviours/practices in the family and community?</p>	
	<p>e) mention appropriate life skills required to cope with adolescent sexuality and sexual behaviour.</p>	<p>i) Students in groups using guidelines to role play on appropriate use of life skills to cope with adolescent sexuality and sexual behaviour. ii) Students in their groups to outline key messages in the role-play and mention the appropriate life skills required to cope with adolescent sexuality and sexual behaviour. iii) The teacher to lead plenary discussion and make clarifications on appropriate life skills required to cope with adolescent sexuality and sexual behaviour such as self esteem, problem solving and decision making skills.</p>	<p>Video tapes, pictures, photographs and charts showing different life skills required to cope with adolescent sexuality and sexual behaviour.</p>	<p>Is the student able to mention appropriate life skills required to cope with adolescent sexuality and sexual behaviours?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
6.8 Family Planning and Contraception.	<p>The student should be able to:</p> <p>a) explain the concepts of family planning and contraception.</p>	<p>i) Students to discuss on the concepts of family planning and contraception.</p> <p>ii) The teacher to invite a guest speaker (health specialist) to talk on family planning and contraception and their advantages and disadvantages.</p> <p>iii) Students in groups to observe and examine various family planning devices displayed.</p> <p>iv) The teacher to guide students to summarize major ideas in the guest speaker presentation and make conclusion on the meaning and importance of family planning and contraception.</p>	<ul style="list-style-type: none"> • Various family planning devices (condoms, Intra uterine contraceptive device IUD cap or diaphragm, contraceptive pills, spermicide and the calendar. • Charts, pictures, photographs of family planning devices. 	<p>Is the student able to explain the concepts of family planning and contraception?</p>	4
	<p>b) state social cultural practices which enhance family planning.</p>	<p>i) Students in groups to discuss on social cultural practices enhancing family planning.</p> <p>ii) The teacher to organize the students responses and use them to lead a class discussion.</p>	<ul style="list-style-type: none"> • Samples of contraceptives. • Charts/pictures of various contraceptives. • Radio cassette/video tapes. • Texts on merits and demerits of family planning. 	<p>Is the student able to state social cultural practices which enhance family planning?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) outline the importance of male involvement in family planning.	i) Students using guidelines to role play on the importance of male involvement in family planning. ii) The teacher to lead class discussion the importance of male involvement in family planning.	<ul style="list-style-type: none"> • Charts/texts on importance of male involvement in family planning. • Radio cassettes. • Video tapes. • Samples contraceptives. 	Is the student able to outline the importance of male involvement in family planning?	
6.9 Maternal and Child Care.	The student should be able to: a) explain the concept of maternal and child care. b) mention socio- cultural factors which affect maternal and child care in the family and community.	i) Students to discuss the importance of maternal and child care. ii) Teacher to organize the students' responses and use them to lead a discussion on the concept of maternal and child care. i) The teacher to assign group tasks to students to investigate socio-cultural factors which affect maternal and child care in the family and community.	<ul style="list-style-type: none"> • Charts, photographs, pictures illustrating healthy mother and child. • Samples of proper diet for lactating mother and child. • Sample of powdered milk (e.g. Lactogen). • Video tapes. • Picture or photographs of a women breast feeding her child. • Pictures, photographs, charts showing healthy, unhealthy mother and child. • Samples of infant formula e.g. 526 Lactogen). • Video tapes. 	Is the student able to explain the concept of maternal and child care? Is the student able to mention the socio-cultural factors which affect maternal and child care in the family and community?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students to present group tasks for plenary discussion and the teacher to guide students to summarize their responses and make any necessary corrections and clarifications.</p> <p>i) Students to discuss on the way of providing appropriate maternal and child care for people living with HIV and AIDS.</p> <p>ii) Teacher to organize the students' responses and use them to lead a discussion on the ways of providing appropriate maternal and child care for people living with HIV and AIDS.</p> <p>iii) The teacher to invite a guest speaker to talk on way of providing appropriate maternal and child care for people living with HIV and AIDS.</p>	<p>ii) Students to present group tasks for plenary discussion and the teacher to guide students to summarize their responses and make any necessary corrections and clarifications.</p> <p>i) Students to discuss on the way of providing appropriate maternal and child care for people living with HIV and AIDS.</p> <p>ii) Teacher to organize the students' responses and use them to lead a discussion on the ways of providing appropriate maternal and child care for people living with HIV and AIDS.</p> <p>iii) The teacher to invite a guest speaker to talk on way of providing appropriate maternal and child care for people living with HIV and AIDS.</p>	<ul style="list-style-type: none"> • Charts, pictures and photographs of women and children living with HIV and AIDS. • Samples of proper diet for mother and child living with HIV and AIDS. • Video tapes showing ways of providing appropriate maternal and child care for people living with HIV and AIDS. 	<p>Is the student able to suggest appropriate ways of providing maternal and child care for people living with HIV and AIDS (PLWHA)?</p>	

FORM FOUR

CLASS LEVEL COMPETENCES

Student should have the ability to:

1. Make appropriate use of biological knowledge, concepts and principles in solving various problems in daily life.
2. Perform practical activities in growth processes, genetics and evolution.
3. Demonstrate appropriate use of genetic principles to improve animal, crop production and resolve socio-cultural conflicts.
4. Demonstrate positive attitudes towards personal, community and social values as well as resolving health related problems.
5. Group organisms according to their similarities and differences.

CLASS LEVEL OBJECTIVES

By the end of Form Four Course, the student should be able to:

- a) Acquire basic knowledge, skills, concepts, principle and mechanisms of physiological processes in plants and animals.
- b) Develop practical skills in studying growth processes, genetics and evolution.
- c) Apply knowledge, skills and principles of genetics in improving plant and animal breeds as well as resolving socio-cultural conflicts (e.g. Marital conflicts and child rejection).
- d) Develop positive attitude, towards voluntary counseling and testing (VCT) and taking care of people living with HIV and AIDS.
- e) Classify organisms in their respective kingdoms, phylum and class.

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
1.0 GROWTH 1.1 Concept of Growth.	The student should be able to: a) explain the concept of growth.	i) Student to discuss in groups the meaning and importance of growth. ii) The teacher to lead a class discussion on the meaning and importance of growth.	<ul style="list-style-type: none"> Charts/diagrams/pictures showing developmental stages of plants and animals. Real objects. 	Is the student able to explain the concept of growth?	2
	b) investigate internal and external factors affecting growth in plants and animals.	i) The teacher to guide students through questions and answers to mention internal and external factors affecting growth in plants and animals. ii) Students guided by the teacher to carry out experiments to investigate internal and external factors affecting growth in plants and animals.	<ul style="list-style-type: none"> Organic and Inorganic fertilizers. Pesticides and Herbicide. Water. Sunlight. Rope/thread. Young potted plants. Ruler/tape measures. Small animals. A variety of food substances. 	Is the student able to investigate internal and external factors affecting growth in plants and animals?	
1.2 Mitosis and Growth.	The student should be able to: a) explain the concept of mitosis.	i) The teacher to guide students in groups to discuss the concept of mitosis. ii) Students to present their tasks and the teacher to make clarification and conclusion.	<ul style="list-style-type: none"> Charts/models/photographs/diagrams/ slides showing stages of mitosis. Microscope slides Microscope of mitosis. 	Is the student able to explain the concept of mitosis?	6

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) illustrate stages of mitosis.	i) The teacher to guide students in groups to discuss stages of mitosis. ii) Students to illustrate stages of mitosis diagrammatically and the teacher to reflect on the drawings and make necessary clarifications.	<ul style="list-style-type: none"> • Charts/models/ photographs/ diagrams/ slides showing stages of mitosis. • Microscope slides. • Microscope. 	Is the student able to illustrate stages of mitosis?	
	c) explain the significance of mitosis in growth.	i) The teacher to guide students in groups to discuss the significance of mitosis in growth. ii) Students to present their group tasks in a plenary discussion. iii) Teacher to reflect on the presentations and make clarification.	<ul style="list-style-type: none"> • Charts/models/ photographs/ diagrams/ slides showing stages of mitosis. • Microscope slides. • Microscope. 	Is the student able to explain the significance of mitosis in growth?	
1.3 Growth and Developmental stages in Human.	The student should be able to: a) explain the concept of growth and development in human being.	i) Students to discuss the meaning of diffuse growth in groups. ii) The teacher to culminate the discussion by highlighting the meaning of diffuse growth.	<ul style="list-style-type: none"> • Charts/diagram of human growth curve. • Charts/diagrams/ pictures showing developmental stages in man. 	Is the student able to explain the concepts of growth and development in human being?	6

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>iii) Students to use the highlights to deduce the meaning of diffuse growth and distinctive characteristics.</p> <p>b) explain the stages of human postnatal growth and development.</p>	<p>i) Students in groups to observe displayed charts and discuss the stages and changes during human growth and development.</p> <p>ii) The teacher to clarify on the psychological, physical and behavioral changes associated with each stage of human growth and development.</p>	<p>Photographs/charts showing stages of human growth from infancy to old age.</p>	<p>Is the student able to explain stages of human postnatal growth and development?</p>	
	<p>c) explain physiological, psychological and behaviour changes associated with growth and development.</p>	<p>i) Students in small groups to discuss physiological, psychological and behaviour changes associated with growth and development in childhood, adolescence, reproductive age, middle and old age.</p>	<p>Charts on Nutrition, shelter and other basic needs.</p>	<p>Is the student able to explain psychological, psychological and behaviour changes associated with growth and development?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) The teacher to culminate the discussion and clarify major points.</p> <p>i) The teacher to lead students in groups to discuss the factors affecting the rate of physical deterioration of human body and services required to meet the needs of an individual at each stage.</p> <p>ii) Students to investigate the factors which affect the rate of physical deterioration of human body and services required to meet the needs of an individual at each stage.</p>	<p>ii) The teacher to culminate the discussion and clarify major points.</p> <p>i) The teacher to lead students in groups to discuss the factors affecting the rate of physical deterioration of human body and services required to meet the needs of an individual at each stage.</p> <p>ii) Students to investigate the factors which affect the rate of physical deterioration of human body and services required to meet the needs of an individual at each stage.</p>	<p>Photographs/ charts/ diagrams showing human developmental stages.</p> <ul style="list-style-type: none"> Charts/pictures varieties of food. A variety of food substances. 	<p>Is the student able to outline factors which affect the rate of physical deterioration of human body and services required to meet the needs of an individual at each stage?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
1.4 Growth in Flowering Plants.	The student should be able to: a) explain the concept of seed germination.	iii) The teacher to clarify on the study findings and emphasize that improve to reduce factors which affect the rate of physical deterioration of human body and services required to meet the needs of an individual at each stage will enhance the quality of human life. i) The teacher to guide students to explain the concepts of localized growth in plants. ii) Students in groups to observe the germinating seeds and growing regions of a plant for 5-7 days and discuss the changes observed. iii) The teacher to culminate the discussion by highlighting the concept of localized growth and germination in flowering plants.	<ul style="list-style-type: none"> • Germinating seeds. • Ruler/tape measure. • Rope/Thread. • Indian ink. • Cotton wool. • Retina dishes. • Hand lens. • Young plants. 	Is the student able to explain the concept of seed germination?	8

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>b) outline changes which occur during seed germination.</p>	<p>i) Students to discuss the changes which occur during seed germination. ii) The teacher to lead a class discussion on the changes which occur during seed germination.</p>	<p>Extracts/texts on the changes which occur during seed germination.</p>	<p>Is the student able to outline changes which occur during seed germination?</p>	
	<p>c) investigate conditions necessary for seed germination.</p>	<p>i) The teacher to guide students to perform an experiment to investigate the conditions necessary for germination and discuss their findings. ii) Students to deduce from the findings the conditions necessary for germination and present their task in a class discussion. iii) The teacher to reflect on the presentations and point out the conditions necessary for seed germination.</p>	<ul style="list-style-type: none"> • Seeds. • Water. • Cotton wool. • Petri dishes. • Indian ink. • Textual materials. 	<p>Is the student able to investigate conditions necessary for seed germination experimentally?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	d) carry out practical activities to demonstrate epigeal and hypogeal germination.	i) Students in groups to carry out experiments on hypogeal and epigeal germination and report their experiment findings in plenary discussion. ii) The teacher to guide students to take measurement of the growing shoot and root periodically and discuss their findings.	Diagrams/drawings on seed germination.	Is the student able to carry out practical activities to demonstrate epigeal and hypogeal germination?	
2.0 GENETICS 2.1 Concept of Genetics.	The student should be able to: a) explain the concept of genetics. b) state common terms used in genetics.	The teacher to guide student to discuss in groups the meaning of genetics, variations and resemblance which exists among members of the same family. i) The teacher to display all common terms used in genetics.	Photographs/pictures showing members of the same family. Charts showing common terms used in genetic.	Is the student able to explain the concept of genetics? Is the student able to state common terms used in genetics?	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
2.2 Genetic Materials.	<p>The student should be able to:</p> <p>a) explain the concept of genetic materials.</p> <p>b) describe the structure and composition of genetic materials. (Deoxyribonucleic acid and Ribonucleic acid).</p>	<p>ii) Students to discuss on the meaning of each term and synthesize their responses thereby to formulate definition/meaning of each term.</p> <p>iii) The teacher to make clarification and conclusion on the common terms used in genetics.</p>			
		<p>i) Students to discuss on the meaning of genetic material.</p> <p>ii) The teacher to make clarification and conclusion.</p>	<p>Models/charts/pictures showing genetic materials.</p>	<p>Is the student able to explain the concept of genetic materials?</p>	6
		<p>i) Students in groups to observe models/pictures/ photographs of DNA and RNA molecules and discuss its structure and composition.</p> <p>ii) Students to draw and label the structure of DNA and RNA molecule.</p>	<ul style="list-style-type: none"> • Models/diagram/ pictures/ photography DNA molecule. • Plasticine/clay soil/ beads for moulding DNA molecule model. • Zip. 	<p>Is the student able to describe the structure and composition of genetic materials?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		iii) The teacher to lead a class discussion on the structure of DNA and RNA molecules and clarify the students responses.			
	d) differentiate Deoxyribonucleic acid (DNA) from Ribonucleic acid (RNA).	i) Students in groups to observe models/ pictures/ diagrams of DNA and RNA and discuss their differences. ii) The teacher to clarify on the differences between DNA and RNA and make conclusion.	Models/pictures/ diagrams of RNA & DNA and DNA molecules.	Is the student able to differentiate DNA from RNA?	
2.3 Principles of Inheritance. 2.3.1 Concept of Inheritance.	The student should be able to: explain the concept of inheritance.	i) Students in groups to discuss observable features of members of the same family. ii) The teacher to lead plenary discussion and make clarification and conclusion on the concept of inheritance.	<ul style="list-style-type: none"> • Pictures/ photographs of members of the same family. • Flowers and leaves of plants of the same family eg. Okra, Hibiscuss, cotton, bean and pea plants. 	Is the student able to explain the concept of inheritance?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
2.3.2 Mendelian inheritance.	<p>The student should be able to:</p> <p>a) state Mendel's First Law of inheritance.</p>	<p>i) The teacher to organize a study visit at school farm or near by peas/bean farm.</p> <p>ii) Students in groups to observe and discuss different parts of the plant (i.e. stem length, flower colour, pod colour and shape and seed colour and shape).</p> <p>iii) Students to summarize major points and state Mendel's First Law of inheritance.</p>	Mature Pea or bean plant.	Is the student able to state the Mendel's First Law of Inheritance?	8
	<p>b) illustrate monohybrid crosses and interpret their results of crosses and ratios.</p>	<p>i) Students to discuss the meaning of monohybrid crosses and ratios.</p> <p>ii) The teacher to guide students to illustrate using genetic diagrams the monohybrid crosses and ratios.</p>	<ul style="list-style-type: none"> • Fresh green peas/beans pods. • Pictures/photographs. 	Is the student able to illustrate monohybrid crosses and interpret their results of crosses and ratios?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>c) interpret data from monohybrid experiments to demonstrate Mendel's First Law of Inheritance.</p>	<p>i) Students in groups using guidelines to interpret data from monohybrid experiment to demonstrate Mendel's First Law of inheritance and discuss their interpretation findings. ii) The teacher use students findings to make clarifications and conclusion.</p>	<ul style="list-style-type: none"> • Pea/bean seeds. • Beads of two different colors (e.g. black and white/ red and yellow). • Beakers. 	<p>Is the student able to interpret data from monohybrid experiments to demonstrate Mendel's First Law of Inheritance?</p>	
	<p>d) illustrate patterns of Inheritance that follow Mendel's First Law of Inheritance.</p>	<p>i) The teacher to guide students in groups to discuss the patterns of inheritance of albinisms, tongue rolling, ABO and Rhesus factors (Rh factor) blood grouping and sickle cell anaemia. ii) Student to present group tasks in a plenary discussion.</p>	<ul style="list-style-type: none"> • 250gm (1/4 kg) of bean or pea seeds. • 50-100 beads of two different colour (e.g. black and white/red and yellow). • Beakers. 	<p>Is the student able to illustrate patterns of Inheritance that follow Mendel's First Law of Inheritance?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
2.3.3 Non-Mendelian Inheritance.	<p>The student should be able to:</p> <p>a) explain concepts of incomplete dominance and co-dominance.</p>	<p>i) Students in groups to discuss the meaning of Incomplete dominance and co-dominance.</p> <p>ii) The teacher to use students' responses to clarify on the meaning of incomplete dominance and co- dominance.</p>	<ul style="list-style-type: none"> Charts, pictures and photographs showing members of the same family. Pictures/ photographs showing animals with different colour black, white, brown and dotted cow, cat, goat or hen. 	<p>Is the student able to explain the concepts of incomplete dominance and co-dominance?</p>	6
	<p>b) illustrate patterns of inheritance that deviates from Mendel's First Law of Inheritance.</p>	<p>i) Students to discuss on the patterns of inheritance that deviates from the Mendel's First Law of Inheritance.</p> <p>ii) The teacher to organize students responses and use them to describe using genetic diagrams the pattern of inheritance that deviates from the Mendel's First Law of Inheritance.</p> <p>iii) Students to describe patterns of inheritance using genetic diagram.</p>	<ul style="list-style-type: none"> Chart, pictures, photographs. Beads different colors. Beakers. 	<p>Is the student able to illustrate patterns of inheritance that deviates from Mendel's First Law of Inheritance?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
2.4 Sex Determination and Inheritance.	The student should be able to: a) describe the mechanism of sex determination and inheritance.	i) Students in group using genetic diagrams to describe the mechanism of sex determination and inheritance. ii) The teacher to make clarification and conclusion on the mechanism of sex determination and inheritance.	Photographs/pictures showing different animals.	Is the student able to describe the mechanism of sex determination and inheritance?	8
	b) explain the concepts of sex linked, sex limited and sex influenced characters.	i) Students in groups to discuss the meaning of sex linked, sex limited and sex influence characters. ii) Students in groups to discuss observable features of animals of different sex (e.g. long hair of lion, big comb and plumage of hen, long horns of goat and cow). iii) The teacher to make clarification and conclusion on the concepts of sex linked, sex limited and sex influenced characters.	Charts, pictures, photographs showing animals of different sex e.g. long horned goat/cow big comb and plumage of hen.	Is the student able to explain the concept of sex linked, sex limited and sex influenced characters?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) explain the consequences of sex preference and sex selection.	i) Students to discuss on the consequences of sex preference and sex selection. ii) The teacher to organize the student's responses and use them to lead a discussion on the consequences of the sex preference and sex selection. iii) The teacher to invite a guest speaker to talk on sex preference and sex selection and its consequences. iv) Students to summaries major points from the guest speakers presentation that will lead them to explain consequences of sex preference and sex selection.	<ul style="list-style-type: none"> • Samples of study report on socio-cultural factors. • Influencing sex preference and sex selection. 	Is the student able to explain the consequences of sex preference and selection?	
2.5 Variation among Organisms.	The student should be able to: a) explain the concept of variation.	i) Students in groups to observe, discuss and record variations exist among members of the same family.	<ul style="list-style-type: none"> • Pictures/photograph of members of the same family. • Real objects. 	Is the student able to explain the concept of variations?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) The teacher to lead class discussion and make clarifications.</p> <p>i) The teacher to guide students through questions and answers to identify variations among organisms.</p> <p>ii) Students in groups to carry out simple experiments on variations among organisms, record their findings.</p> <p>i) Students in groups to discuss different types of variations.</p> <p>ii) The teacher to lead class discussion on the meaning of continuous and discontinuous variations.</p> <p>i) The teacher to assign group tasks to students to observe and discuss different types of variation existing in organisms around the school surroundings.</p> <p>d) differentiate between continuous and discontinuous variation.</p>	<p>ii) The teacher to lead class discussion and make clarifications.</p> <p>i) The teacher to guide students through questions and answers to identify variations among organisms.</p> <p>ii) Students in groups to carry out simple experiments on variations among organisms, record their findings.</p> <p>i) Students in groups to discuss different types of variations.</p> <p>ii) The teacher to lead class discussion on the meaning of continuous and discontinuous variations.</p> <p>i) The teacher to assign group tasks to students to observe and discuss different types of variation existing in organisms around the school surroundings.</p>	<p>Extracts/texts on variations among organisms.</p> <ul style="list-style-type: none"> • Pictures/ photographs of members of the same species. • Real objects. <p>Variety of organisms around the school surroundings.</p>	<p>Is the student able to identify variations among organisms?</p> <p>Is the student able to give the meaning of continuous and discontinuous variations?</p> <p>Is the student able to differentiate between continuous and discontinuous variation?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) Students to discuss the differences between continuous and discontinuous variation. iii) Using the information collected the teacher to clarify on the differences between continuous and discontinuous variations.			
	e) explain causes of variation among organisms.	i) Students to discuss and suggest the possible causes of variation among organisms. ii) The teacher to jot down the students response in the chalk board and give comments and clarifications on the causes of variation among organism.	Variety of organisms showing different variations.	Is the student able to explain causes of variation among organisms?	
2.6 Genetic Disorders.	The student should be able to: a) give the meaning of genetic disorders.	i) Students in groups to observe the DNAB molecules model and discuss the arrangement of bases.	<ul style="list-style-type: none"> • Model of DNA molecule. • Pictures/photographs showing individuals with different genetic disorders. 	Is the student able to give the meaning of genetic disorders?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>b) Explain types of genetic disorders.</p>	<p>ii) The teacher to guide students to alter the sequence of bases of the DNA molecule model and discuss its consequences (genotypically and phenotypically). iii) The teacher to summarise students' responses and guide them to formulate proper meaning of genetic disorders.</p> <p>i) Students in groups to discuss various types of genetic disorders (e.g. Turner syndrome, Down's syndrome and Mongolia). ii) The teacher to lead a plenary discussion on the various types of genetic disorders.</p>	<ul style="list-style-type: none"> • Charts/photographs/ actor of suckled red blood cells. • Pictures/ photographs showing people with different types of genetic disorders (e.g. Turner's syndrome, Down's Syndrome, or Mongolia, super males, super females, haemophilia and colour blindness). 	<p>Is the student able to Explain types of genetic disorders?</p>	<p>8</p>

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) explain the causes and effects of genetic disorders.	i) Students in groups to discuss causes and effects of genetic disorders and present their group tasks for plenary discussion. ii) The teacher to lead plenary discussion and give comments and clarification on the causes and effects of genetic disorders.	<ul style="list-style-type: none"> • Sample of chemicals such as caffeine, nicotine. • Samples of drugs. • Food preservative. • Charts/pictures showing the effect of X-rays, gamma rays and Ultra Violet light to organisms. 	Is the student able to explain the causes and effects of genetic disorders?	
2.7 Application of Genetics.	The student should be able to: a) outline application of genetics in everyday life. b) explain the importance of genetics in biological science and related fields.	i) Students in groups to discuss on the application of genetics in livestock and crop production. ii) The teacher to organize student's responses and use them to lead a class discussion.	<ul style="list-style-type: none"> • Pictures/photographs/charts showing crops and livestock hybrids. • Sample of genetically modified food. • Pictures/photographs showing genetically modified food. 	Is the student able to outline applications of genetics in everyday life? Is the student able to explain the importance of genetics in biological science and related fields?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) The teacher to use student responses to discuss and make clarification on the importance of genetics in biological science and related fields.	<ul style="list-style-type: none"> • Pictures/photographs showing genetically modified organisms. • Samples of genetically modified food. 		
3.0 CLASSIFICATION OF LIVING THINGS 3.1 Kingdom Animalia.	The student should be able to: a) explain the general and distinctive features of the Kingdom Animalia..	i) The teacher to display live preserve animal specimens and students to group according to their similarities and differences. ii) Students in groups using guiding questions to observe the collected and displayed organisms, identify and record their common characteristics. iii) The teacher to lead students in a class discussion on the general and distinctive features of the kingdom Animalia and make clarifications.	<ul style="list-style-type: none"> • A variety of animals. • Pictures and charts of organisms in kingdom animalia. • Charts of characteristics of Kingdom Animalia. 	Is the student able to explain the general and distinctive features of the Kingdom Animalia?	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>b) mention the major phyla of the kingdom Animalia.</p>	<p>i) The teacher to guide students to observe and group organisms according to their similarities and differences. ii) Students to classify organisms to their respective phyla and the teacher to clarify on students misconceptions.</p>	<ul style="list-style-type: none"> • A variety of animals. • Charts, diagrams and pictures of different animals. • Charts showing characteristics of phyla of Kingdom Animalia. 	<p>Is the student able to mention the major phyla of the Kingdom Animalia?</p>	
3.1.1 Phylum Platyhelminthes.	<p>The student should be able to:</p> <p>a) explain the general and distinctive features of the phylum Platyhelminthes.</p>	<p>i) Students using hand lens to observe preserved specimens of flatworms and record their physical features. ii) The teacher to lead a class discussion on the general and distinctive features of phylum Platyhelminthes. iii) Students to outline the general and distinctive features of phylum Platyhelminthes and the teacher to make clarifications.</p>	<ul style="list-style-type: none"> • Preserved specimens. • Preserved tapeworms, liverfluke. • Diagrams/pictures of flat worms eg planaria liver fluke tapeworms. • Hand lenses. 	<p>Is the student able to explain with examples the general and distinctive features of the phylum Platyhelminthes?</p>	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>b) describe the structure of organisms under the phylum Platyhelminthes.</p>	<p>i) Students in groups using hand lenses to observe the tapeworm (<i>Taenia</i>) and record its distinctive features. ii) The teacher to lead a plenary discussion about the structure and general and distinctive features of a tapeworm (<i>Taenia</i>). iii) The teachers to guide students to describe the structure of tapeworm and give clarifications. iv) Student to draw a well labeled diagram of a tapeworm.</p>	<ul style="list-style-type: none"> • Pictures of flat worms (Tape worm, liver fluke, <i>Planaria</i>). • Charts of the general and distinctive features of phylum Platyhelminthes. • Preserved specimen of flatworms. • Charts of the general and distinctive features of Tapeworm. 	<p>Is the student able to describe the structure of organisms under the phylum Platyhelminthes.</p>	
	<p>c) explain the advantages and disadvantages of Tapeworm.</p>	<p>i) The teacher to lead students to discuss the advantages and disadvantages of flatworms. ii) Students to outline the advantages and disadvantages of Tapeworms.</p>	<p>Pictures/preserved specimen of Tape worms.</p>	<p>Is the student able to explain the advantages and disadvantages of tapeworm?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
3.1.2 Phylum Aschelminthes (Nematoda).	<p>The students should be able to:</p> <p>a) explain general and distinctive features of the phylum Aschelminthes.</p>	<p>i) Students in groups to observe preserved round worms or pictures and diagrams of round worms and record their distinctive characteristics.</p> <p>ii) The teacher to guide students to discuss in a plenary the distinctive features of round worms and give clarifications.</p>	<ul style="list-style-type: none"> • Preserved specimen of round worms (<i>Ascaris</i>) hookworms. • Hand lenses • Pictures, charts or photographs of roundworms. 	<p>Is the student able to explain general and distinctive features of the phylum Aschelminthes?</p>	4
	<p>b) describe the structure of organisms under the phylum Aschelminthes.</p>	<p>i) Students using hand lenses to observe and identify posterior and anterior ends of a roundworm.</p> <p>ii) The teacher to guide the students to identify anterior and posterior ends of <i>Ascaris</i> and describe their distinctive features.</p> <p>iii) Students to draw and label a diagram of the roundworms (<i>Ascaris</i>).</p>	<ul style="list-style-type: none"> • Preserved specimen of <i>Ascaris</i>. • Charts, pictures and diagrams of <i>Ascaris</i>. • Hand lens. 	<p>Is the student able to describe the structure of organisms under the phylum Aschelminthes?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	c) outline the advantages and disadvantages of roundworms.	i) Student in groups to discuss the advantages and disadvantages of the phylum Aschelminthes and present their work in a plenary session. ii) The teacher to reflect on the presentations giving comments and clarification.	Charts of phylum Aschelminthes Earthworms.	Is the student able to outline the advantages and disadvantages of roundworms?	
3.1.3 Phylum Annelida.	The student should be able to: a) explain general and distinctive features of the phylum Annelida.	i) Students to observe organisms under the phylum Annelida (earthworm and leeches) and discuss their characteristic. ii) The teacher to lead plenary discussion on the general and distinctive feature of the phylum Annelida.	<ul style="list-style-type: none"> • Diagrams and pictures/ photographs of leeches and earthworms. • Chart of show the structure of leeches and earthworms. • Preserved specimens of annelids. 	Is the student able to explain the general and distinctive features of the phylum Annelida?	
	b) describe structures of organism under the phylum Annelida (Earthworm).	i) Students using hand lens to observe preserved and live specimens of earth worms to identify body parts.	<ul style="list-style-type: none"> • Live or preserved earthworms. • Diagrams pictures of earthworm. • Hand lens. 	Is the student able to describe structures of organism under the phylum Annelida?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) Students in groups to record their observations, draw and label diagram of an earthworm to show its external features. iii) The teacher to lead a plenary discussion on the structure of the earth worm.			
	c) explain the advantages and disadvantages of earthworm.	i) Students in groups to discuss advantages and disadvantages of Lumbricus (earthworm). ii) The teacher to lead a class discussion on the advantages and disadvantages of earthworms.	<ul style="list-style-type: none"> • Pictures, diagram or photographs showing earthworm. • Live or preserved specimen. • Hand lens. 	Is the student able to explain the advantages and disadvantages of earthworm?	
3.1.4 Phylum Arthropoda.	The student should be able to: a) explain general and distinctive features of the phylum Arthropoda.	i) The teacher to lead a plenary discussion on general and distinctive features of phylum Arthropoda.	<ul style="list-style-type: none"> • Pictures Diagrams of arthropods. • Preserved or live specimens of varieties of Arthropods. • Hand lens. 	Is the student able to explain the general and distinctive features of the phylum Arthropoda?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) Students in groups using guiding questions to observe and record the distinctive and general features of the collected/ displayed specimens of Arthropods.			
	b) mention classes of the phylum Arthropoda.	i) Students in groups to observe variety of arthropods and groups them according to their similarities and differences. ii) The teacher to lead a plenary discussion and make necessary clarifications of a variety of arthropods (live or preserve specimens).	<ul style="list-style-type: none"> • Pictures and photographs of variety of arthropods. • Chart of classes of arthropods. • Hand lens. 	Is the student able to mention the classes of the phylum Arthropoda?	
	c) cite examples of organisms under each class of the phylum Arthropoda.	i) Using guidelines students to collect variety of organisms belonging to each class of the phylum Arthropoda.	Variety of organism of each class of the phylum Arthropoda.	Is the student able to cite examples of organisms under each class of the phylum Arthropoda?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students in groups to discuss the characteristics features of organisms under each class and cite examples of organisms belonging to each class.</p>	<p>ii) Students in groups to discuss the characteristics features of organisms under each class and cite examples of organisms belonging to each class.</p>			
	<p>d) explain distinctive features of each class of the phylum Arthropoda.</p>	<p>i) Students in groups to discuss the general and distinctive characteristics of one of the five classes of phylum Arthropoda. ii) The teacher to guide the students in their groups to discuss and come up with the correct general and distinctive characteristics of the respective class.</p>	<ul style="list-style-type: none"> • A variety of Arthropods (live or preserved specimens). • Charts, pictures, photographs showing varieties of Arthropods. 	<p>Is the student able to explain distinctive features of each class of the phylum Arthropoda?</p>	
	<p>e) describe structures of representative organisms under each class.</p>	<p>i) Students in groups to observe organisms of each of the phylum Arthropoda and discuss their characteristics feature.</p>	<ul style="list-style-type: none"> • Varieties of organisms of each class of phylum arthropod. • Charts/pictures/ photographs showing of arthropods. 	<p>Is the student able to describe the structures of representative organisms under each class?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) Students to draw well labeled diagrams of representative organisms under each class of the phylum Arthropoda. iii) The teacher to lead a plenary discussion and reflect on students responses to make general comments and clarifications.			
	f) explain the advantages and disadvantages of the organisms under each class of phylum Arthropoda.	i) Teacher to guide students in groups to discuss the advantages and disadvantages of each class of the phylum Arthropoda. ii) Students to present their group tasks in plenary session and the teacher to reflect on the students responses and give clarifications.	<ul style="list-style-type: none"> Chart showing advantages of each class of phylum arthropoda. Varieties of Arthropods (live or preserved species). 	Is the student able to explain the advantages and disadvantages of each class of the phylum Arthropoda?	
3.1.5 Phylum Chordata.	The student should be able to: a) explain general and distinctive characteristics features of the phylum Chordata.	i) The teacher to guide students to observe a variety of common chordates and record their observations.	<ul style="list-style-type: none"> Pictures, charts or showing varieties of common chordates e.g. mice, frog, lizard, birds, fish, snake, mouse and rats. 	Is the student able to explain the general and distinctive characteristics features of the phylum chordate?	8

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>ii) Students to present their responses in plenary for discussion.</p> <p>iii) The teacher to guide students in a class discussion to outline the general and distinctive features of phylum chordate.</p>	<p>ii) Using question and answers, the teacher to lead students to identify different groups within the phylum Chordata.</p> <p>ii) Students in groups to discuss on different Chordata.</p> <p>iii) The teacher to lead plenary discussion and give necessary clarifications.</p>	<ul style="list-style-type: none"> • Live or preserved specimen of chordates e.g. frog, fish, lizard rats and birds. 		
	<p>b) mention classes of the phylum Chordata.</p>	<p>i) Using question and answers, the teacher to lead students to identify different groups within the phylum Chordata.</p> <p>ii) Students in groups to discuss on different Chordata.</p> <p>iii) The teacher to lead plenary discussion and give necessary clarifications.</p>	<ul style="list-style-type: none"> • Charts/pictures/photographs of different chordates in their respective classes. • Varieties of chordates (live or Preserved specimens). 	<p>Is the student able to mention the classes of the phylum Chordata?</p>	
	<p>c) explain distinctive features of each class of the phylum Chordata.</p>	<p>i) The teacher to organize students into groups and assign each group a task of collecting information from relevant textual materials about classes of phylum Chordata.</p> <p>ii) Students to present their findings in a plenary session.</p>	<ul style="list-style-type: none"> • Charts/pictures/photographs showing different chordates in their respective classes. • Varieties of chordates (live or preserved specimens). 	<p>Is the student able to explain the distinctive characteristics of each class of the phylum Chordata?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	<p>d) describe structure of representative organisms in each class of phylum Chordata.</p>	<p>i) Students individually to describe the features of some common chordates draw and label them to show their external features. ii) The teacher to guide students individually to draw and label the named organisms to show their external features.</p>	<p>Live or preserved specimens of Tilapia (fish), birds, frog/ road lizard and rat/ mouse lizard and rat/mouse.</p>	<p>Is the student able to describe the structure of representative organisms from each class of phylum Chordata?</p>	
	<p>e) outline the advantages and disadvantages of the organisms under each class of phylum Chordate.</p>	<p>i) The teacher to guide students to discuss in groups the advantages and disadvantages of each class of the phylum Chordata. ii) Students to tabulate the advantages and disadvantages of each class of phylum Chordate.</p>	<ul style="list-style-type: none"> • Live or preserved specimens of different chordates. • Charts/pictures /photographs showing different chordates. 	<p>Is the student able to outline the advantages and disadvantages of organisms under phylum Chordate?</p>	
<p>4.0 EVOLUTION 4.1 Concept of Organic Evolution.</p>	<p>The students should be able to: explain the concept of organic evolution.</p>	<p>i) The teacher to lead students through questions and answers to give the meaning of organic evolution. ii) Students to discuss the meaning of organic evolution.</p>	<p>VIPP cards on the concept of organic evolution.</p>	<p>Is the student able to explain the concept of organic evolution?</p>	<p>2</p>

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
4.2 Theories of the Origin of life.	<p>The student should be able to:</p> <p>a) outline the basic ideas about the origin of life.</p>	<p>i) The teacher to prepare cards or texts on the basic ideas about the origin of life.</p> <p>ii) Students using the prepared cards or texts to discuss in small groups the basic ideas about the origin of life and present their task.</p> <p>iii) The teacher to lead a class discussion, give general comments and make conclusion.</p>	<ul style="list-style-type: none"> • VIP Cards. • Texts extracted from various sources on the basic ideas about the origin of life. 	<p>Is the student able to outline the basic ideas about the origin of life?</p>	4
	<p>b) state the theories of the origin of life.</p>	<p>i) Using guiding questions, students to discuss in small groups the theories of the origins of life such as special creation, spontaneous generation and steady state theories.</p> <p>ii) Students to present group tasks in plenary discussion and the teacher to guide them in summarizing the major ideas.</p>	<p>Texts extracted from various sources explaining theories of the origin of life.</p>	<p>Is the student able to state the theories of the origin of life?</p>	
4.3 Theories of Organic Evolution. 4.3.1 Lamarckism.	<p>The student should be able to:</p> <p>a) state Lamarck's theory of evolution.</p>	<p>i) The teacher to lead a class discussion on the major ideas of the Lamarck's theory of evolution.</p> <p>ii) Students to summarize the major ideas of Lamarck's theory of evolution.</p>	<p>V.I.P.P cards on the major idea of Lamarck's theory.</p>	<p>Is the student able to state Lamarck's theory of evolution?</p>	2

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) explain Lamarck's observations and deductions.	i) Using questions and answers, the teacher to lead students to point out the Lamarck's observation and deduction. ii) Students to summarize their responses on the Lamarck's observations and deductions.	Chart on the Lamarck's observation and deductions.	Is the student able to explain Lamarck's observations and deductions?	
	c) outline merits and demerits of Lamarck's theory of evolution.	i) Students to brainstorm on the merits and demerits of Lamarck's theory of evolution. ii) The teacher to guide students to organize and summarize their responses on the merits and demerits of Lamarck's theory of evolution.	A chart on the merits and demerits of Lamarck's theory of evolution.	Is the student able to outline the merits and demerits of Lamarck's theory of evolution?	
4.3.2 Darwinism.	The student should be able to: a) state Darwin's theory of evolution.	i) The teacher to lead a class discussion on the major idea of Darwin's theory of evolution. ii) Students to summarize the major ideas in order to state Darwin's theory of evolution.	V.I.P.P cards on the Darwin's theory of evolution.	Is the student able to state Darwin's theory of evolution?	4

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
	b) outline Darwin's observations and deductions.	i) The teacher to guide students in groups to discuss Darwin's observations and deductions using guiding questions. ii) Students to present group tasks in plenary discussion.	A chart showing summary of Darwin's observations and deductions.	Is the student able to outline Darwin's observations and deductions?	
	c) explain the theory of natural selection in relation to the mechanism of evolution.	i) Students to discuss in groups and make presentations on the major ideas in the theory of natural selection in relation to the mechanisms of evolution. ii) The teacher to lead plenary discussion and guide students to summarize major ideas, make clarifications and conclusion.	A chart showing major ideas of the theory of natural selection.	Is the student able to explain the theory of natural selection in relation to the mechanisms of evolution?	
	d) explain merits and demerits of Darwin's theory.	i) Students to discuss in groups the merits and demerits of Darwin's theory of evolution using guiding questions. ii) Students to present in plenary their group tasks.	Manila sheet showing tabulation of merits and demerits of Darwin's theory of evolution.	Is the student able to explain the merits and demerits of Darwin's theory?	

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4.4 Evidence of Organic Evolution.	<p>The student should be able to:</p> <p>a) mention sources of evidence which support organic evolution.</p> <p>b) explain evidence of organic evolution.</p>	<p>i) The teacher to guide students through questions and answers to list down sources of evidence of organic evolution.</p> <p>ii) The teacher to lead a class discussion on the sources of evidence of organic evolution.</p> <p>i) Students in groups to observe pictures or photographs and discuss the evidences of organic evolution.</p> <p>ii) Students to present their group tasks in plenary discussion and the teacher to guide them to summarize major points and make clarifications.</p>	<p>Photographs of remains of plants and animals in rocks.</p> <p>Photographs/pictures of fossils in the rock strata.</p>	<p>Is the student able to mention sources of evidence which support organic evolution?</p> <p>Is the student able to explain the evidence of organic evolution?</p>	6
	<p>c) investigate evidences and application of organic evolution in the real life situation.</p>	<p>i) The teacher to organize a study tour to the archives historical sites which show the evidences of organic evolution.</p> <p>ii) Students in groups to discuss the major findings from the study tour, prepare a report and present in plenary discussion.</p>	<p>Photographs / pictures of fossils in the rocks.</p>	<p>Is the student able to investigate evidences and application of organic evolution in real life situation?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		iii) The teacher to lead plenary discussion, guide students to summarize their findings and make conclusion.			
5.0 HUMAN IMMUNO DEFICIENCY VIRUS (HIV) 5.1 Relationship between HIV, AIDS and STIs.	The student should be able to: a) distinguish between HIV, AIDS and STIs.	i) The teacher to guide students to brainstorm on the differences between HIV, AIDS and STIs. ii) Students to record the differences between HIV, AIDS and STIs.	<ul style="list-style-type: none"> • Reports from UNAIDS, NACP and TACAIDS. • Charts on AIDS in Africa. 	Is the student able to distinguish between HIV, AIDS and STIs?	
	b) explain the relationship between HIV and STIs.	i) The teacher to lead a class discussion on relationship between HIV and STIs focusing on similarities, differences, mode of transmission and effects. ii) Students to record and summarize major ideas on the relationship between HIV and STIs. iii) Students to carry out an investigation on the impact of HIV/AIDS and STIs in the community.	<ul style="list-style-type: none"> • Reports on HIV/AIDS and STIs. • Charts on AIDS in Africa/World/Tanzania. 	Is the student able to explain the relationship between HIV and STIs?	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
5.2 Management and Control of HIV, AIDS and STIs.	<p>The student should be able to:</p> <p>a) outline ways of managing and controlling HIV, AIDS and STIs.</p> <p>b) mention the life skills needed for home based care for PLWHA.</p>	<p>i) The teacher to lead students to discuss ways of management and control of HIV, AIDS and STIs.</p> <p>ii) Students to present their task in a plenary discussion.</p>	<ul style="list-style-type: none"> • Mammal on management HIV, AIDS and STIs. • Reports on HIV, AIDS and STIs. • Extracts/texts on HIV, AIDS and STIs. 	<p>Is the student able to outline ways of managing and controlling HIV, AIDS and STIs?</p>	6
	<p>b) mention the life skills needed for home based care for PLWHA.</p>	<p>i) The teacher to prepare extracts from or magazines on the management of HIV, AIDS/STIs.</p> <p>ii) Students in groups to discuss life skills needed for management and control of HIV, AIDS and STIs.</p> <p>iii) Students in groups to role play how to use different life skills in the management and control of HIV, AIDS and STIs.</p>	<ul style="list-style-type: none"> • Life skill manual. • Extracts/texts on Life skills for management of HIV, AIDS and STIs. 	<p>Is the student able to mention the appropriate life skills needed for home based care for PLWHA?</p>	
	<p>c) Mention precautions to be taken when handling people living with HIV, AIDS (PLWHA) and STIs.</p>	<p>i) Students in groups to discuss on the necessary precautions when handling HIV infected people and those with STIs/STDs.</p> <p>ii) Students to share their group work in a plenary session.</p>	<ul style="list-style-type: none"> • Brochures and fliers on methods of handling people living with HIV and AIDS. • Charts on HIV/AIDS/STIs in Africa/World/Tanzania. 	<p>Is the student able to mention precautions to be taken when handling people living with HIV, AIDS (PLWHA) and STIs.</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
5.3 Counseling and voluntary Testing (CVT).	<p>The student should be able to:</p> <p>a) explain the concept of counseling and voluntary testing.</p> <p>b) Outline the significance of CVT in the control and prevention of HIV, AIDS and STIs.</p>	<p>i) Students in group to discuss the meaning and importance of counseling voluntary and testing.</p> <p>ii) Students to present their group tasks in a plenary discussion and the teacher to give clarifications where necessary.</p>	<ul style="list-style-type: none"> • CVT manual. • Reports on HIV/ AIDS/ STIs. 	<p>Is the student able to explain the concept counseling and voluntary testing (CVT)?</p>	
	<p>b) Outline the significance of CVT in the control and prevention of HIV, AIDS and STIs.</p>	<p>i) The teacher to lead students through questions and answers to outline the significance of CVT in the control of HIV, AIDS and STIs.</p> <p>ii) Students in groups to discuss the significance of CVT in the control and prevention of HIV and STIs.</p> <p>iii) Students to present their tasks in a plenary session and the teacher to give clarifications.</p>	<ul style="list-style-type: none"> • Manuals on CVT. • Reports on CVT. 	<p>Is the student able to outline the significance of CVT in control and prevention of HIV and STIs?</p>	
	<p>c) explain the procedures and techniques of CVT for HIV and AIDS.</p>	<p>i) The teacher to provide guidelines on the procedures and techniques of counseling voluntary and testing.</p>	<ul style="list-style-type: none"> • Manuals on counseling voluntary and Testing for HIV, AIDS and / STIs. • Extracts/texts on procedures and techniques of CVT. 	<p>Is the student able to explain the procedures and techniques for counseling voluntary and testing for HIV and AIDS?</p>	

TOPICS/ SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING AND LEARNING STRATEGIES	TEACHING AND LEARNING RESOURCES	ASSESSMENT	NUMBER OF PERIODS
		ii) Students in groups to discuss the procedures and techniques for CVT and record the main ideas. iii) Students to share their findings and observations in plenary discussion.			