CARIBBEAN EXAMINATIONS COUNCIL

Caribbean Secondary Education Certificate

Human and Social Biology Syllabus

Effective for examinations from May/June 2011

Correspondence related to the syllabus should be addressed to:

The Pro-Registrar
Caribbean Examinations Council
Caenwood Centre
37 Arnold Road, Kingston 5, Jamaica, W.I.

Telephone Number: (876) 920-6714
Facsimile Number: (876) 967-4972
E-mail address: cxcwzo@cxc.org
Website: www.cxc.org

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Please note that the syllabus was revised and amendments are indicated by italics and vertical lines.

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Please check the website www.cxc.org for updates on CXC's syllabuses.

Contents

Human and Social Biology Syllabus

♦ RATIONALE

Human beings require knowledge of the ways in which the human body functions, of the interdependence of living things, and of the ways the total environment functions to support life on earth in all its forms, in order to make intelligent decisions on matters at home, at work or in society, which routinely affect their health and, therefore, the quality of their lives. The study of Human and Social Biology provides students at secondary schools with an opportunity to begin acquiring this knowledge.

Human and Social Biology is concerned with the study of the structure and functioning of the human body. It also involves the application of biological principles, knowledge *and skills, and technological advances,* to the maintenance of health and to *solve* the problems of living together. The subject incorporates the view that human beings have a responsibility to their environment and, as such, have an obligation to conserve, protect, maintain and improve its quality.

The CSEC Human and Social Biology syllabus is designed to allow students to work individually and cooperatively, utilizing theoretical concepts of the course in interactive and practical activities. Students are expected to apply investigative and problem-solving skills, be effective in communicating scientific knowledge and demonstrate an appreciation for all living organisms in their environment.

The CSEC syllabus in Human and Social Biology provides *Caribbean* students with a foundation for further study in fields where an understanding of the structure and functioning of the human body and the application of biological principles to the maintenance of health have relevance. It also helps to provide students with knowledge, skills and *attitudes* that are important for maintaining a healthy lifestyle.

♦ AIMS

The syllabus aims to:

1. develop an understanding of the structure and functioning of the human body;
2. increase awareness about the interdependence of living things *as they live in harmony with* the environment;
3. develop competencies that will enable students to adopt healthy lifestyles;

4. *develop experimental and data interpretation skills;*

5. *increase awareness of technological advances;*

6. provide a foundation for further study or specialised training in fields such as, nursing, physiotherapy or dietetics, which require an understanding of the structure and functioning of the human body and the application of biological principles to the maintenance of health and healthy living.

♦ GENERAL OBJECTIVES

On completion of this syllabus, students should:

1. understand the processes that govern the interactions of organisms in the environment and the processes by which life is perpetuated;

2. understand the nature of the interdependence of the processes, structures and functions of the major systems, within an organism in the maintenance of health;

3. understand *the role of* nutrition *in helping* living organisms *to* obtain their energy and satisfy their physical needs;

4. understand the mechanisms by which characteristics pass from parent to offspring;

5. *become aware of* the importance of genetic variation;

6. understand the basic concepts of human well-being and disease;

7. appreciate the nature of the relationship between human beings and their environment;

8. appreciate that the environment is fragile and there is need to preserve it;

9. appreciate the contribution of modern technology to the maintenance of good health.

♦ SUGGESTED TIME-TABLE ALLOCATION

It is recommended that a minimum of five 40-minute periods per week over two academic years or the equivalent be allocated to the syllabus.

♦ ORGANIZATION OF THE SYLLABUS

The syllabus is organised under five main sections:

1. Living organisms and the environment.
2. Life processes.
3. Heredity and variation.
4. Disease and its impact on humans.
5. The impact of health practices on the environment.

In this syllabus, the Specific Objectives which are denoted by an asterisk are particularly suitable for practical activities. However, the practical activities need not be limited to these objectives.

♦ CERTIFICATION

The syllabus will be examined at the General Proficiency only. Candidates will be awarded an overall grade reported on a 6-point scale. In addition to the overall grade, candidates' performance will be reported by a letter grade under the profile dimensions, Knowledge and Comprehension, and Use of Knowledge.

♦ DEFINITION OF PROFILE DIMENSIONS

On completion of the syllabus, students are expected to develop skills under two profile headings:

(i) Knowledge and Comprehension (KC);

(ii) Use of Knowledge (UK).

<u>Knowledge and Comprehension (KC)</u>

The ability to:

(i) identify, remember and grasp the meaning of basic facts, concepts and principles;

(ii) select appropriate ideas, match and compare facts, concepts and principles in familiar situations.

Use of Knowledge (UK)

The ability to:

(i) use facts and apply concepts, principles and procedures in familiar and new situations;

(ii) interpret and draw inferences from practical laboratory exercises;

(iii) analyse, organise and evaluate information in an effort to make reasoned judgements and recommendations.

♦ FORMAT OF THE EXAMINATION

Candidates will be required to take Paper 01 and Paper 02.

Paper 01
(1 hour 15 minutes)

Sixty multiple-choice items drawn from all areas of the syllabus.

Paper 02
(2 hours)

Section A - four compulsory structured questions drawn from all areas of the syllabus. One question will be an investigative type/practical oriented question. Each question is worth 15 marks (6 KC, 9 UK).

Section B - two compulsory structured essay questions drawn from all areas of the syllabus. Each question is worth 15 marks (6 KC, 9 UK).

MARK AND WEIGHTING ALLOCATION FOR THE PROFILE DIMENSIONS

Profile dimension	Paper 01		Paper 02		Total	
	Raw Score	%	Raw Score	%	Raw Score	%
Knowledge and Comprehension	60	40	36	24	96	64
Use of Knowledge	-		54	36	54	36
TOTAL	**60**	**40**	**90**	**60**	**150**	**100**

♦ REGULATIONS FOR PRIVATE CANDIDATES

Candidates who are registered privately will be required to sit Paper 01 and Paper 02.

Private candidates must be entered through institutions recognized by the Council.

♦ REGULATIONS FOR RESIT CANDIDATES

Resit candidates will be required to sit Paper 01 and Paper 02.

Resit candidates must be entered through a school or other approved educational institution.

♦ SECTION A: LIVING ORGANISMS AND THE ENVIRONMENT

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
1. *describe* the characteristics of living organisms;	Nutrition, respiration, excretion, growth, irritability, movement, reproduction.
2. *compare* the structures of an unspecialized plant and animal cell and selected microbes;	*Basic* structure of unspecialized plant cell, animal cell *and microbes.* (a) *Labelled* diagrams of plant and animal cell. (b) Microbes to include: (i) virus; (ii) bacteria; p. 292 (iii) fungi. p. 295 ***(Link to Specific Objective D7)***
3. state the functions of cell *structures*;	Cell wall, cell membrane, nucleus, ribosomes, cytoplasm, mitochondria, vacuoles, chloroplasts, *endoplasmic reticulum.*
4. identify *selected cells* which make up the human body;	Diagrams and features required: (a) epithelial cells; (b) sperm cells; (c) egg cells; (d) nerve cells; (e) muscle cells.
5. explain the importance of cell specialization in humans;	(a) Cell differentiation. (b) Relation of cells to the organism as a whole.
6. distinguish between osmosis and diffusion;*	

LIVING ORGANISMS AND THE ENVIRONMENT (cont'd)

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
7. explain the importance of osmosis, diffusion *and active transport* in living systems;	Movement of substances across the cells. (a) Osmosis as a special type of diffusion. (b) Cell membrane as a partially permeable membrane. (c) Movement of water from cell to cell. (d) Examples of osmosis occurring in plants and animals. (e) Diffusion of gases in and out of a living cell. (f) Experimental activity to demonstrate osmosis and diffusion in living cells. (g) Active transport - *movement of ions against a concentration gradient using energy.* ***(Link to Specific Objectives B 1.24, B1.26)***
8. explain the process of photosynthesis;	(a) *Definition of photosynthesis.* (b) Simple treatment involving *word* equation to summarize the process. (c) Site of photosynthesis (*chloroplast*). (d) Fate of products of photosynthesis.
9. *investigate the effect of light and chlorophyll on the production of starch;**	
10. explain the ways in which other living organisms depend on plants directly or indirectly for food;	(a) Plants as producers. (b) *Human beings* dependence on plants directly or indirectly for food.
11. *explain the principles of* a food chain;	*Definition of a food chain and* trophic level; names of organisms feeding at each trophic level (omnivore, carnivore, herbivore, *producer, primary and secondary consumers*); reduction of available energy at each trophic level; utilization of energy at each trophic level.
12. *construct* a food chain from a selected habitat;	Terrestrial and aquatic (marine and fresh water) habitats.

LIVING ORGANISMS AND THE ENVIRONMENT (cont'd)

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
13. identify the trophic level of organisms in the food chain;	
14. describe the recycling of carbon and nitrogen in nature.	*The importance of recycling nitrogen and carbon in nature*; Nitrogen cycle: the up-take of nitrates by green plants and the formation of plant proteins; inability of plants to use nitrogen in its unreactive forms; the role of plants, animals and micro-organisms in the nitrogen cycle; the role of legumes; the role of herbivores; the role of bacteria and fungi as decomposers. Carbon cycle: the importance of CO_2 in photosynthesis; carbon as a derivative of carbon dioxide; the transformation of carbon to carbohydrates in photosynthesis; examples of carbon compounds that release carbon when burnt; the release of carbon dioxide during *combustion*, respiration and decomposition.

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Section, teachers are advised to engage students in the teaching and learning activities listed below.

1. Arrange for students to view charts and diagrams on plants and animal cells, microbes and nitrogen and carbon cycles.
2. Arrange for students to view plants and animal cells as projected by a light microscope.
3. Encourage students to construct models of plants *and* animal cells, *carbon and nitrogen cycles.*
4. Conduct laboratory activities pertaining to osmosis and diffusion, *and photosynthesis.*
5. Use video presentations and computer assisted learning (Internet, CDs) to enhance learning.

♦ SECTION B: LIFE PROCESSESS

1. NUTRITION

SPECIFIC OBJECTIVES		EXPLANATORY NOTES
Students should be able to:		
1.1	*describe* the major nutrients and their sources;	Starch, reducing and non-reducing sugars, lipids, proteins; *mention* chemical and physical properties of carbohydrates, lipids and proteins.
1.2	*state* the *function and the main sources* of vitamin A, B_1, C, D and *the* minerals calcium and iron;	
1.3.	state the cause, symptoms and treatment of deficiency diseases;	*Night* blindness, anaemia and rickets.
1.4.	classify vitamins as fat or water soluble;	(a) *Fat soluble - A, D, E, K.* (b) *Water soluble - B, C.*
1.5	perform tests to distinguish among food nutrients;*	*Starch, reducing sugars, non-reducing sugars, protein and fat.* ***(Link to Specific Objective A8)***
1.6	state the functions of water in the body;	*Include* water as a solvent, for hydrolysis and as a transport medium.
1.7	state the role of dietary fibre in the body;	
1.8	describe the causes and effects of constipation and diarrhoea;	*Including proper hygiene in the preparation of food.*
1.9	*explain what is meant by a* balanced diet;	Interpretation of data, *include Caribbean food groups.*
1.10.	*explain* the effects of malnutrition on the human body;	Definition of malnutrition (*over and under nutrition*), obesity, *anorexia and bulimia, protein and energy malnutrition (kwashiorkor, marasmus).*
1.11	*determine Body Mass Index (BMI);*	*Weight (kg)/Height ^{2}(m)* $\frac{\text{Weight (kg)}}{\text{Height}^2\text{(m)}}$

LIFE PROCESSESS (cont'd)

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
1.12 *use tables, charts and graphs to represent data on nutrition;*	
1.13 relate the types of teeth present in an infant and an adult human to their roles;	*Diagrams required.*
1.14 describe the importance of teeth in the process of digestion;	
1.15 describe the structure and function of a typical tooth;	Internal and external structures; *diagrams required.*
1.16 *relate the structures of the tooth to their functions;*	*Functions of enamel, dentine, pulp cavity, cement.*
1.17 state the causes of tooth decay;	
1.18 *describe the process of tooth decay;*	*Include conversion of food into acids by bacteria.*
1.19 *outline guidelines for* the care of the teeth;	
1.20 explain the properties, role and importance of enzymes involved in digestion;	*Include site of production.*
1.21 investigate the effects of temperature and pH on the activity of the enzymes, amylase and catalase in the digestive process;*	*Include construction and interpretation of graphs.*
1.22 identify the various structures of the digestive system;	*Diagram of alimentary canal required.*
1.23 relate the structures of the digestive system to their functions;	
1.24 describe the process of digestion and absorption of food in the alimentary canal;	*Include mechanical (mastication) and chemical digestion.* ***(Link to Specific Objective A7)***

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
1.25 describe what happens to the products of digestion after their absorption;	*Fate of glucose, amino acids, fatty acids and glycerol; assimilation; role of liver.* ***(Link to Specific Objective B5.2)***
1.26 describe the structure of a villus in relation to absorption;	*Diagram required.* ***(Link to Specific Objective A7)***
1.27 *distinguish between egestion and excretion.*	***(Link to Specific Objective B 5.1)***

2. THE RESPIRATORY SYSTEM

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
2.1 explain the importance of breathing in humans;	
2.2 *relate the structures of the respiratory tract to their functions;*	*Diagram of respiratory system.*
2.3 describe the breathing mechanism;*	*Emphasis on principles involved. Demonstrate using a model.*
2.4 outline the factors affecting rate of breathing;	Exercise, smoking, anxiety, drugs, environmental factors, altitude, weight. ***(Link to Specific Objective D5)***
2.5 *explain the* concept of vital capacity;	*Graphical representation required.*
2.6 *distinguish between gaseous exchange and breathing;*	*Inclusion of gaseous exchange in the alveoli; diagram of alveolus required.*
2.7 identify characteristics common to gaseous exchange surfaces;	
2.8 differentiate between aerobic and anaerobic respiration;	Definition of aerobic and anaerobic respiration; *the products of respiration;* description of industrial and domestic applications of anaerobic respiration; *oxygen debt; worded equations to represent the processes of aerobic and anaerobic respiration.*
2.9 explain the role of adenosine diphosphate (ADP) and adenosine triphosphate (ATP) in the transfer of energy;	Adenosine triphosphate as the energy currency of the cell.

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
2.10. *explain* the technique of mouth-to-mouth resuscitation;	
2.11 *explain the effects of cigarette smoking;*	*Effects of smoking as it relates to nicotine addiction, damage to the lungs, carcinogenic properties and reduction in oxygen-carrying capacity of the blood. Interpretation of data.*
2.12 *use tables, graphs and charts to represent data on the respiratory system.*	

3. THE CIRCULATORY SYSTEM

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
3.1 explain the need for *a* transport system in the human body;	Limitations of simple diffusion; the relationship between surface area and volume. ***(Link to Specific Objective A7)***
3.2 identify the materials which need to be transported around the human body;	
3.3 relate the structures of the heart to their functions;	Chambers, valves and blood vessels of the heart (*diagrams required*), *pacemaker*; comparison of the differences in thickness of the right and left ventricles.
3.4. describe the structure and function of the heart;	The role of the heart as a double pump.
3.5 *explain the concept of blood pressure*;	Systole and diastole.
3.6 describe the structure and function of the circulatory system in humans;	Pulmonary versus systemic circulation.
3.7 relate the components of the blood to its function;	*Plasma, serum, red blood cells, white blood cells, platelets.*
3.8 relate the structures of the arteries, veins and capillaries to their functions;	*Diagrams required; thickness of walls, size of lumen, presence or absence of valves.*
3.9 relate the structures of red blood cells, phagocytes and lymphocytes to their functions;	*Diagrams required.*
3.10 explain the process and the importance of blood clotting;	Role of platelets, *fibrinogen, calcium ions, thrombin in blood clotting.*

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
3.11 explain the causes and effects of heart attacks;	*Include hypertension (high blood pressure) atherosclerosis, coronary thrombosis, artificial pacemaker. Interpretation of data.* ***(Link to Specific Objective D6)***
3.12 *use tables, charts and graphs to represent data on the circulatory system;*	
3.13 describe the structure and function of the lymphatic system;	Role of tissue fluid and lymph; location and function of lymph nodes.
3.14 describe how tissue fluid and lymph are formed.	*Diagram required.*

4. SKELETAL SYSTEM

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
4.1 identify the major bones of the skeleton;	*Cranium, clavicle, scapula, vertebral column, humerus, radius, ulna, rib cage, sternum, pelvic girdle, femur, tibia, fibula.*
4.2 relate the structure of the skeleton to its *functions;*	*Movement, protection, support, breathing, production of blood cells.*
4.3 *relate the structure of a typical bone to its functions;*	*Diagram of long bone required (internal view).*
4.4 distinguish between bone and cartilage;	Comparison of characteristics of bone and cartilage.
4.5 explain the importance of cartilage;	
4.6 distinguish between tendons and ligaments;	Comparison *of characteristics and functions* of tendons and ligaments.
4.7 identify a hinge joint, fixed joint, and ball and socket joint;	*Diagrams required.* Definition of the term joint; location of joints.
4.8 describe movement in the hinge *joint, and* ball and socket joint;	
4.9 identify the biceps and triceps of the upper arm;	*Diagrams required;* points of origin (location and definition); points of insertion (location and definition)
4.10 explain how skeletal muscles function in the movement of a limb;	*Diagrams required;* the role of antagonistic muscles in the movement of limbs; *effect of exercise* – muscle *tone.*
4.11 explain the importance of locomotion to man;	
4.12 *evaluate the factors which adversely affect the skeletal system.*	*Include posture and poor foot-wear.*

5. EXCRETION AND HOMEOSTASIS

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
5.1 *explain the importance of* excretion *in human beings;*	*Include* definition of excretion. ***(Link to Specific Objective B1.27)***
5.2 explain the roles of the organs involved in excretion;	*Lungs, skin and kidney; examples of metabolic wastes.*
5.3 relate the structures of the kidney to their function;	Internal structure of the kidney (*diagram required*), structure and function of the nephron (diagram required); selective reabsorption of substances; composition of urine; *mention renal dialysis.*
5.4 relate the structures of the skin to their functions;	*Diagram required.*
5.5 *explain the concept of homeostasis;*	Definition of homeostasis; examples of homeostasis.
5.6 explain the concept of feedback mechanisms;	*Include regulation of carbon dioxide (CO_2).*
5.7 describe the regulation of blood sugar;	Role of insulin and glucagon. ***(Link to Specific Objective D6)***
5.8 explain *the* regulation *of water;*	
5.9. distinguish between heat and temperature;	
5.10 describe *the regulation of temperature.*	

6. COORDINATION AND CONTROL

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
6.1 *describe* the main divisions of the nervous system;	*(a) Central nervous system - the brain; spinal cord.* *(b) Peripheral nervous system: spinal nerves and cranial nerves, and autonomic nervous system.*
6.2 *describe the functions of the parts of the brain;*	*Cerebrum, cerebellum, medulla oblongata, hypothalamus, pituitary glands.*
6.3 distinguish between a neurone and a nerve;	(a) *Diagram of neurones required.* (b) Definitions. (c) Properties of *neurones;* irritability; conductivity; structures of neurons, cell-bodies, axons and dendrites.
6.4 explain the functions of motor and sensory *neurones* and spinal synapses;	(a) *Functions and types of nerves: motor, sensory, mixed.* (b) Synapse and chemical transmitters.
6.5 *describe the mechanisms of* a reflex action;*	Definition; structure of spinal cord (diagram required); the spinal reflex action (for example, knee jerk reflex); *cranial reflex action (for example, pupil reflex);* reaction to painful stimuli; *Demonstration of knee jerk reflex.*
6.6 explain the process by which voluntary actions occur;	Definition; transmission of nerve impulses; involvement of neurones in the brain, spinal cord and effector muscles.
6.7 *distinguish between a voluntary and involuntary action;*	
6.8 explain the response of the sense organs to stimuli;	Names of sense organs; stimuli to which they respond.

LIFE PROCESSESS (cont'd)

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
6.9. relate the internal structures of the eye to their functions;	*Diagram of eye (internal view) required.*
6.10 explain how images are formed in the eye;	*Diagrams required.*
6.11 explain accommodation in the eye;	
6.12 describe the causes of, and corrective measures for eye defects;	Long and short-sightedness (*diagrams required*), astigmatism, *include diseases the glaucoma and cataracts.*
6.13 distinguish between *endocrine* (hormonal) and nervous control systems;	
6.14 identify the sites of hormone production;	*Diagram required.*
6.15 explain the roles of *selected* hormones in the human body.	*Pituitary - anti-diuretic hormone (ADH), follicle simulating hormone (FSH), luteinising hormone (LH), growth hormones; Thyroid – thyroxine;* *Pancreas - insulin, glucagon; Adrenals - adrenaline Ovary - oestrogen, progesterone; Testes – testosterone.*

7. REPRODUCTIVE SYSTEM

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
7.1 distinguish between sexual and asexual reproduction;	
7.2 describe the structure and function of the reproductive systems in human *beings*;	*Include the structures of the gametes, diagram of systems required; related disorders such as ovarian, cervical and prostrate cancers.* ***(Link to Specific Objectives A4; D7)***
7.3 describe the menstrual cycle;	*Use of diagram for illustration; include role of hormones: follicle stimulating hormone (FSH), luteinising hormone (LH), oestrogen, progesterone.* ***(Link to Specific Objective B6.15)***
7.4 explain *ovulation*, fertilisation, implantation and development of the embryo;	*Diagram of foetus in uterus required; role of placenta, umbilical cord and amniotic sac;* ***minute details of stages of development are not required.***
7.5 describe the birth process;	
7.6 outline the importance of *prenatal* care;	Importance of ante-natal and post-natal care including the advantages of breastfeeding.
7.7 *explain how birth control methods prevent pregnancy;*	Natural, barrier, hormonal and surgical.
7.8 explain the advantages and disadvantages of birth control methods;	*Include the use of condoms to prevent STIs.* ***(Link to Special Objectives D8, D9)***
7.9 *discuss the* issues related to abortion;	*Include spontaneous abortion (miscarriage);* reasons for; advantages and disadvantages of abortion.
7.10 explain the importance of family planning;	*Social and economic implications.*
7.11 *use tables, charts and diagrams to* represent data.	

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Section, teachers are advised to engage students in the teaching and learning activities listed below.

1. Arrange for students to view audio visuals showing how the heart beats, how antagonistic muscles work to achieve movement and documentaries on the different birth control methods.

2. Draw and use charts and models to assist students with learning of the structures of different organs.

3. Undertake a brainstorming and discussion session to ascertain students knowledge of topics. This type of activity may be used to generate interest before formal teaching/learning begins.

4. Arrange for students to view displays of specimens of bones, the heart, kidney, stomach and alimentary tract of animals. A convenient source is the local butcher.

5. Conduct demonstrations such as dissection or examination of specimen, for example, eye or brain.

6. *Demonstrate the effects of light in the eye, that is, pupil and spinal reflex.*

7. Arrange field trips to hospitals or clinics to expose students to operations that could assist with understanding some of the life processes.

8. Conduct research on the impact of diet on health, especially in the Caribbean.

9. Use flow charts to illustrate processes such as regulation of body temperature, glucose concentration in blood and osmoregulation.

10. Organise a science fair and invite members of school population or immediate community to view students' displays.

11. Use video presentations and computer assisted learning (Internet, CDs) to enhance learning.

12. Conduct laboratory activities.

♦ SECTION C: HEREDITY AND VARIATION

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
1. *describe the* process of mitosis;	Definition of mitosis; movement of chromosomes during mitosis (names of stages not required); *diagrams required.*
2. *explain the importance of mitosis;*	Production of identical daughter cells having the same number (diploid) and type of chromosomes as the parent cell (clones); *growth, repair and asexual reproduction.*
3. *describe* the process of meiosis;	*Definition of meiosis; movement and separation of homologous chromosomes and the subsequent separation of chromatids (names of stages not required); diagrams required.*
4. *explain* the importance of meiosis;	Importance of halving the chromosome number (*haploid*) in the formation of gametes; importance of meiosis in introducing variation into gametes.
5. explain why genetic variation is important to living organisms;	Examples of variation - height, weight, gender (sex), blood type, tongue rolling; *mention antibiotic resistant bacteria.*
6. distinguish between genetic variation and environmental variation;	*Include* the difference between continuous and discontinuous variation; *Mutation, (Down's Syndrome, albinism).*
7. explain the inheritance of a single pair of characteristics (monohybrid inheritance);	(a) DNA/RNA, chromosome, allele, dominant, recessive, homozygous, heterozygous, gene, *genotype and phenotype.* (b) Monohybrid inheritance to include: albinism, sickle cell anaemia, *tongue rolling; sex linkage* (haemophilia, colour blindness)
8. describe the inheritance of sex in human *beings;*	*Include the role of sex chromosones.*

HEREDITY AND VARIATION (cont'd)

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
9. *explain the concept of genetic engineering;*	*Changing the traits of one organism by inserting genetic material from another organism.*
10. *discuss the advantages and disadvantages of genetic engineering;*	*Include recombinant DNA in the manufacture of insulin; its application in the production of food and medicine.*
11. *use tables, charts and graphs to represent data on heredity and variation.*	

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Section, teachers are advised to engage students in the teaching and learning activities listed below.

1. *Arrange for* students to construct models of mitosis and meiosis.
2. *Assign* students to construct models depicting genetic crosses.
3. Encourage students to investigate variation of a particular characteristic for example, height, length of index finger, foot size.
4. Use video presentations and computer assisted learning (Internet, CDs) to enhance learning.

♦ SECTION D: DISEASE AND ITS IMPACT ON HUMANS

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
1. define *the terms* good health *and disease;*	*WHO definition which relates to physical, mental and social well being and not just the absence of disease.*
2. classify diseases;	*Communicable (infectious diseases) and non communicable diseases (chronic* or degenerative disease, nutritional deficiency disease, inherited disorders).
3. differentiate between the terms signs and symptoms;	
4. state the main causes, primary symptoms and possible treatment of asthma;	
5. *explain how asthma affects the respiratory tract;*	
6. *discuss the causes, signs/symptoms, treatment modality and prevention of chronic/lifestyle related diseases;*	(a) Obesity, diabetes mellitus (type I and type II) and *cardiovascular disease (hypertension and coronary heart disease).* (b) Diabetes mellitus (type II) and secondary hypertension as complications of obesity. (c) *The importance of diet and exercise.* ***(Link to Specific Objective B3.11)***
7. *discuss the causative agent, signs, symptoms, prevention and control of infectious diseases;*	Acute respiratory infection (*influenza, bronchitis, pneumonia*), sexually transmitted *infections (STIs)* (gonorrhoea or syphilis, herpes), ringworm, typhoid, tuberculosis, cholera, gastroenteritis. ***(Link to Specific Objective A2)***

DISEASE AND ITS IMPACT ON HUMANS (cont'd)

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
8. *discuss the cause, symptoms, mode of action, prevention and control of HIV/AIDS.*	*Include method of transmission, methods of limiting spread/prevention and possible treatment of HIV/AIDS (anti-retroviral drugs - side effects).*
9. *describe* the effects of sexually transmitted *infections (STIs)* on the pregnant mother and the foetus;	
10. *discuss the impact of diseases on the human population;*	*Socio-economic implications, analysis and interpretation of data.*
11. *discuss the effects of malaria and dengue (strain I - IV) on the human body;*	*Signs and symptoms, causative agent, method of transmission, prevention/control and treatment.*
12. explain the effect of vectors on human health;	Definition of vectors: rats, mosquitoes, houseflies. *Include mode of action.*
13. describe the life cycle of the mosquito and housefly;	*Diagrams required.*
14. *explain the importance and methods of controlling vectors which affect human health;*	*Spread of communicable fatal diseases, leptospirosis, dengue fever, gastroenteritis.*
15. *explain how and why personal hygiene is maintained;*	Elimination of body odours; social acceptance; prevention of infections; prevention of dental carries. *Include male circumcism. Care of genetalia.* ***(Link to Special Objective B7.2)***
16. *explain the methods used to control the growth of microorganisms;*	(a) Definition of the term sterilization, methods of sterilization (ultra high temperature, pasteurization, autoclaving, boiling, canning). (b) Effects of high temperatures, disinfectants and antiseptics in the control of microorganisms. (c) Disinfection - use of chemical agents (chlorine, disinfectants, antiseptics).

DISEASE AND ITS IMPACT ON HUMANS (cont'd)

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
17. *distinguish between disinfectants and antiseptics;*	
18. explain the use of common antibiotics and antifungal agents;	Definition of antibiotics. Antigen, antibody, anti-toxin.
19. *explain the types of immunity;*	
20 *distinguish between immunity and immunization; vaccine and vaccination;*	Artificial, active and passive, natural passive, acquired.
21. discuss the use and *misuse* of drugs;	*Include* dependence; Prescription (sedatives, *pain killers and antibiotics*); Non prescription (cocaine, LSD, heroin, ecstasy, alcohol, marijuana; *physiological and psychological effects.*
22. explain the social effects of drug *misuse* on the individual, family and community;	Analysis and interpretation of data.
23. *use tables, graphs and charts to represent data on disease and its impact on human* beings.	

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Section, teachers are advised to engage students in the teaching and learning activities listed below.

1. Invite guest lecturers to discuss health related issues.
2. Use video presentations and computer assisted learning (Internet, CDs) to enhance learning.
3. Demonstrate, for example, the proper use of condoms.
4. Arrange public visits to clinics or national associations, for example, Diabetes Association, Heart Foundation.
5. Assign students to conduct research on *the misuse of substances.*

♦ SECTION E: THE IMPACT OF HEALTH PRACTICES ON THE ENVIRONMENT

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
1. identify pollutants in the environment;	*Definition of pollution and pollutant;* including domestic, industrial and agricultural pollutants.
2. *discuss* the causes of water *and air pollution;*	
3. *describe the effects of pollutants on human beings and the environment;*	Analysis and interpretation of data. ***(Link to Specific Objective B2.4)***
4. explain the methods of controlling pollution;	
5. describe the water cycle;	*Diagram required; include evaporation, condensation, transpiration, respiration, filtration.*
6. describe simple ways of purifying water in the home;	*Boiling, chlorine/bleach.*
7. *test water for bacteria;**	*Agar plate.* ***(Link to Specific Objective A2)***
8. *describe* the *processes involved in* large scale water purification;	*Screening, sedimentation, filtration, chlorination.*
9. discuss the impact of human activities on water supplies;	
10. explain why contaminated water is detrimental to human beings;	***(Link to Specific Objective D7)***
11. distinguish between proper and improper sewage disposal practices;	
12. explain the impact of improper sewage disposal practices;	

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
13. compare the treatment of sewage by biological filter and activated sludge methods;	*Include the role of microorganisms in the treatment of sewage.* ***(Link to Specific Objective A2)***
14. relate the parts of a pit latrine to their functions;	*Diagram required.*
15. explain why the *siting* of pit latrines is important;	*Sandy soil, vicinity to water sources.*
16. *assess the use of pit latrines in the Caribbean;*	*Advantages, disadvantages, phasing out.*
17. evaluate the efficiency of the methods of domestic refuse disposal;	*Analysis and interpretation of data.*
18. describe the operations at a *landfill;*	*Include a* description of *a* landfill.
19. *discuss the importance of landfills in the Caribbean;*	Function of landfill.
20. evaluate the impact of solid waste on the environment;	*Analysis and interpretation of data.*
21. analyse measures used to control solid waste volume;	*Reduce, reuse and recycle, examples of recyclable materials.*
22. *distinguish between the* terms biodegradable and non-biodegradable;	*Include classification of biodegradable and non-biodegradable items.*
23. *use tables, charts and graphs to represent data on the impact of health practices on the environment.*	

◆ SECTION E: THE IMPACT OF HEALTH PRACTICES ON THE ENVIRONMENT

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
1. identify pollutants in the environment;	*Definition of pollution and pollutant*; including domestic, industrial and agricultural pollutants.
2. *discuss* the causes of water *and air pollution*;	
3. *describe the effects of pollutants on human beings and the environment*;	Analysis and interpretation of data. ***(Link to Specific Objective B2.4)***
4. explain the methods of controlling pollution;	
5. describe the water cycle;	*Diagram required; include evaporation, condensation, transpiration, respiration, filtration.*
6. describe simple ways of purifying water in the home;	*Boiling, chlorine/bleach.*
7. *test water for bacteria;**	*Agar plate.* ***(Link to Specific Objective A2)***
8. *describe* the *processes involved in* large scale water purification;	*Screening, sedimentation, filtration, chlorination.*
9. discuss the impact of human activities on water supplies;	
10. explain why contaminated water is detrimental to human beings;	***(Link to Specific Objective D7)***
11. distinguish between proper and improper sewage disposal practices;	
12. explain the impact of improper sewage disposal practices;	

THE IMPACT OF HEALTH PRACTICES ON THE ENVIRONMENT (cont'd)

SPECIFIC OBJECTIVES	EXPLANATORY NOTES
Students should be able to:	
13. compare the treatment of sewage by biological filter and activated sludge methods;	*Include the role of microorganisms in the treatment of sewage.* ***(Link to Specific Objective A2)***
14. relate the parts of a pit latrine to their functions;	*Diagram required.*
15. explain why the *siting* of pit latrines is important;	*Sandy soil, vicinity to water sources.*
16. *assess the use of pit latrines in the Caribbean;*	*Advantages, disadvantages, phasing out.*
17. evaluate the efficiency of the methods of domestic refuse disposal;	*Analysis and interpretation of data.*
18. describe the operations at a *landfill;*	*Include a* description of *a* landfill.
19. *discuss the importance of landfills in the Caribbean;*	Function of landfill.
20. evaluate the impact of solid waste on the environment;	*Analysis and interpretation of data.*
21. analyse measures used to control solid waste volume;	*Reduce, reuse and recycle, examples of recyclable materials.*
22. *distinguish between the* terms biodegradable and non-biodegradable;	*Include classification of biodegradable and non-biodegradable items.*
23. *use tables, charts and graphs to represent data on the impact of health practices on the environment.*	

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Section, teachers are advised to engage students in the teaching and learning activities listed below.

1. Arrange visits to sewage *treatment plants, landfills* and water treatment *plants.*

2. Assign students to conduct research on pit latrines, landfills, sewage *treatment* plants and water treatment plants.

3. Assign students to carry out investigation involving data collection in the community or home on the impact of solid waste and make suggestions on how related problems may be resolved.

4. Conduct brainstorming and discussion sessions to ascertain students' knowledge on topics.

5. Use charts and other audiovisual aids to assist students with learning the processes involved in water treatment and sewage treatment.

6. Use video presentations and computer assisted learning (Internet, CDs) to enhance learning.

♦ RESOURCES

The following is a list of books that might be used for Human and Social Biology. Each student should have access to at least one text.

Gadd, P.	*CXC Human and Social Biology*, Oxford: MacMillian Education, 2007.
Pickersing, R. and Robb, D.	*Human and Social Biology for Caribbean Schools*, Oxford: Oxford University Press, 2006.
Ragoobirsingh, D. and Fullick, A.	*Human and Social Biology for CSEC*, Essex: Pearson Education Limited, 2007.
Waugh, A. and Grant, A. (Editors)	*Ross and Wilson Anatomy and Physiology in Health and Illness*, United Kingdom: Churchill Livingstone, 2001.

♦ GLOSSARY

WORD/TERM	DEFINITION/MEANING	
annotate	Add a brief note to a label.	(Simple phrase or a few words only; UK)
apply	Use knowledge/principles to solve problems.	(make inferences/ conclusions; UK)
appraise	To judge the quality or worth of.	(UK)
assess	Present reasons for the importance of particular structures relationships or processes	(compare the advantages and disadvantages or the merits and demerits of a particular relationship or process; UK)
calculate	Arrive at the solution to a numerical problem.	(steps should be shown; units must be included; UK)
classify	Divide into groups according to observable characteristics.	(UK)
comment	State opinion or view with supporting reasons.	(UK)
compare	State similarities and differences.	(an explanation of the significance of each similarity and difference stated may be required for comparisons which are other than structural, KC/UK)
construct	Use a specific format to make and/or draw a graph, histogram, pie chart or other representation using data or material provided or drawn from practical investigations, build (for example, a model), draw scale diagram.	(such representations should normally bear a title, appropriate headings and legend; UK)

WORD/TERM	DEFINITION/MEANING	
deduce	Make a logical connection between two or more pieces of information; use data to arrive at a conclusion.	(UK)
define	State concisely the meaning of a word or term.	This should include the defining equation/formula where relevant. (KC)
demonstrate	Show clearly by giving proof or evidence; direct attention to.	(KC)
derive	To deduce; determine or extract from data by a set of logical steps some relationship, formula or result.	(This relationship may be general or specific). (UK)
describe	Provide detailed factual information of the appearance or arrangement of a specific structure or the sequence of a specific process.	Descriptions may be in words, drawings or diagrams or any appropriate combination. Drawings or diagrams should be annotated to show appropriate detail where necessary. (KC)
determine	Find the value of a physical quantity.	
design	Plan, and present with appropriate practical detail.	(Where hypotheses are stated or when tests are to be conducted, possible outcomes should be clearly stated and/or the way in which data will be analyzed and presented).
develop	Expand or elaborate an idea or argument with supporting reasons.	(KC/UK)
differentiate/distinguish (between/among)	State or explain briefly those differences between or among items which can be used to define the items or place them into separate categories.	(KC)

WORD/TERM	DEFINITION/MEANING	
discuss	Present reasoned arguments; consider points both for and against; explain the relative merits of a case.	(UK)
draw	Make a line representation from specimens or apparatus that shows an accurate relationship between the parts.	(In case of drawings from specimens, the magnification must always be stated. A diagram is a simplified representation showing the relationship between components. KC/UK)
estimate	Make an approximate quantitative judgment.	
evaluate	Weigh evidence and make judgments based on given criteria.	(The use of logical supporting reasons for a particular point of view is more important than the view held; usually both sides of an argument should be considered. UK)
explain	Give reasons based on recall; account for.	(KC)
find	Locate a feature or obtain as from a graph.	(UK)
formulate	To express in a formula or in a systematic manner.	(UK)
identify	Name or point out specific components or features.	(KC)
illustrate	Show clearly by using appropriate examples or diagrams, sketches.	(KC/UK)
investigate	Use simple systematic procedures to observe, record data and draw logical conclusions.	

WORD/TERM	DEFINITION/MEANING	
justify	To prove a statement or claim true.	(UK)
label	Add names to identify structures or parts indicated by pointers.	(UK)
list	Itemize without detail.	(KC)
measure	Take accurate quantitative readings using appropriate instrument.	
name	Give only the name of.	(No additional information is required).
note	Write down observations.	
observe	Pay attention to details which characterize a specimen, reaction or change taking place; to examine and note scientifically.	(Observations may involve all the senses and/or extensions of them, but would normally exclude the sense of taste).
plan	Prepare to conduct an exercise.	
predict	Use information provided to arrive at a likely conclusion or suggest a possible outcome.	(UK)
record	Write an accurate description of the full range of observations made during a given procedure.	This includes the values for any variable being investigated where appropriate recorded data may be depicted in graphs, histograms or tables.
relate	Show connections between; explain how one set of facts or data depend on others or are determined by them.	(UK)
sketch	Make a simple freehand diagram showing relevant proportions and any important details.	(KC)

WORD/TERM	DEFINITION/MEANING	
state	Provide factual information in concise terms, omitting explanation.	(KC)
suggest	Offer an explanation deduced from information or previous knowledge.	(No correct or incorrect solution is presumed but suggestions must be acceptable within the limits of scientific knowledge; UK).
suggest an hypothesis	Provide a generalisation which offers a likely explanation for a set of data or observations.	(UK)
test	To find out by following set procedures.	

Western Zone Office
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