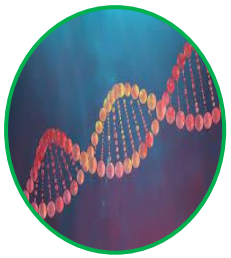
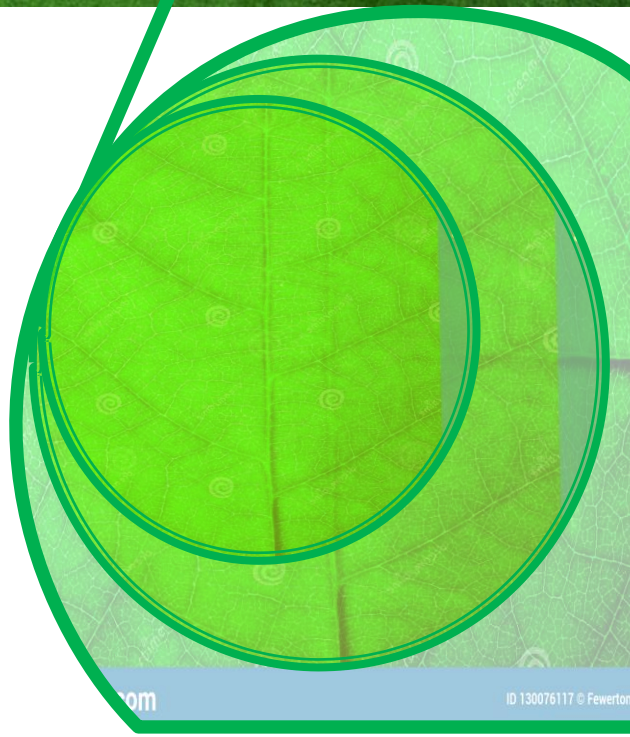
Grade 11 CSEC Biology Syllabus Objectives

Herbert Morrison Technical High School Science Department





Grade 11 Biology Topics with Objectives

SECTION A - LIVING ORGANISMS IN THE ENVIRONMENT

TOPICS	OBJECTIVES	CONTENT/EXPLANATORY NOTES
TRANSPORT IN PLANTS	4.7 explain how the structure of xylem vessels is suited for their function;	Hollow tubes- non-living with lignified walls; no end walls- allow for a continuous flow of water.
	4.8 discuss the role of the process of transpiration in plants;	Transpiration stream from roots to leaves to be included.
	4.9 describe the effect of external factors on transpiration;	Light intensity, temperature, humidity, and air movements should be included.
	4.10 discuss adaption in plants to conserve water;	Simple treatment of root length, cuticle thickness, water storage.
	4.11 explain how the structure of the phloem is suited to its function;	Source□------>□ Sink Translocation; storage organs; growing points. **Formation of fruits/seeds;** **germination.**

STORAGE IN PLANTS	4.12 identify the products stored in plants and animals and the sites of storage;	Roots, stems, leaves, fruits, seeds in plants; the liver, fat deposits in animals to be included. Detailed structure of storage organs not required. Carry out food tests for starch, sugars and oil in storage organs.
	4.13 discuss the importance of food storage in living organisms.	Storage as a means of overcoming the need for continuous food intake or manufacture, providing for periods of scarcity, providing for special functions, such as, production of sexual or vegetative reproductive structures, development of embryos. Draw and annotate stages in germinating seeds; Draw buds from plant storage organs (stems and Tubers

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EXCRETION, OSMOREGULATION AND HOMEOSTASIS	5.1 distinguish between egestion and excretion; Undigested material versus bilirubin in faeces, and urea in urine.	
	5.2 discuss the importance of excretion in living organisms;	Implications of toxicity. For example, carbon dioxide, heat, urea, water, oxygen, calcium oxalate and tannins.
	5.3 state how metabolic wastes are excreted from plants and animals; Leaf fall, loss of bark and storage in plants; lungs, skin, urinary systems in humans to be included.	
	5.4 relate the kidney to its osmoregulatory and excretory functions.	Highlight structure of the urinary system and kidney tubule; The function of the parts. Mention kidney failure and dialysis.

MOVEMENT	6.1 distinguish between growth movements in plants and movement in animals;	Annotated simple diagrams of the gross kidney structure and that of the nephron to illustrate the production of urine required. The distinction should be made between: (a) growth movement as shown by germinating seedlings, (c) Locomotion/whole movement as illustrated by animals.
	6.2 relate the structure of the skeleton to its function in humans;	Functions to include protection, support, locomotion, blood formation. Examine a human skeleton.
	6.3 discuss the importance of locomotion in animals;	Comparison with flowering plants; make reference to role in nutrition and reproduction.

IRRIRABILITY		
	6.4 describe the mechanism of movement in a human fore limb.	The relationship between the bones and muscles of a limb. Behaviour of antagonistic muscles; types of joint, action at moveable joints. Draw, label and annotate a simple diagram of the long bone of a fore limb. Simple line drawing to show the relationships. Note origin and insertion of muscles.
	7.1 Define 'stimulus' and 'response';	
	7.2 Describe the response of: (a) green plants to stimuli;	The response of stems and roots of seedlings to light, touch and gravity. Relate observations to the behaviour of plants in natural situations.

	(b) invertebrates to variations in light intensity, temperature and moisture;	The response of invertebrates for example, millipedes, earthworms or woodlice.
	7.3 define receptor and effector;	Sense organs, muscle and glands. Leaf, petiole, apical meristem
	7.4 explain why the response to stimuli is important for the survival of organisms;	
	7.5 explain the relationship among the receptor, the central nervous system and the effector;	Emphasis on the coordinating function of the brain and spinal cord and the roles of sensory and motor neurones.
	7.6 explain a simple reflex action;	Use of simple flow diagrams to show the pathway along which the impulse travels in the reflex. Diagrams showing a spinal cord and spinal nerves not required. Investigate changes in pupil size in response to changes in light intensity,

		using mirrors, or the knee jerk reflex.
	7.7 describe the functions of the main regions of the brain;	Cerebrum, cerebellum and medulla.
	7.8 discuss the physiological, social and economic effects of drug abuse;	Include alcohol and one illegal drug. Mention the use and abuse of prescription drugs, for example, diet pills, tranquilisers, steroids, caffeine and analgesics (painkillers).
	7.9 relate the structure of the human eye to its functions as a sense organ;	Cross section or longitudinal section of the eye required. Role of rods and cones as specialized receptor cells.
	7.10 explain accommodation; sight defects and the corrections of each;	Long and near sightedness; the use of corrective lenses; glaucoma.

	7.11 relate structure of the human skin to its function in temperature regulation and protection.	Role of skin structures in temperature control as an example of homeostasis is required. Mention skin care and the effect of chemicals. The importance of melanin and SPF (simple treatment only). Discuss the **skin bleaching** phenomenon.
GROWTH	8.1 make deductions from simple investigations designed to demonstrate growth in living organisms; plants and animals.	Examples could involve measuring changes in length, mass or surface area using roots, leaves, or other suitable material or counting the number of leaves in a named plant from seedling to fruiting plant. Include cell division in meristem; Comparison of growth in plants and animals.
	8.2 describe the structure of a dicotyledonous seed;	Functions of the seed. Draw, label and annotate the external and internal structures of a seed.

	8.3 describe the processes taking place within a seed during germination.	Include breakdown of food stores and translocation to growing points.
REPRODUCTION	9.1 compare sexual and asexual reproduction;	Explanation that sexual reproduction leads to variation in the off-spring while asexual reproduction is conservative -offspring identical to the parent.
	9.2 describe the structure and function of the reproductive systems in humans;	Male and female reproductive systems. Functions of the various parts.
	9.3 describe the menstrual cycle;	The roles of oestrogen and progesterone and the effect of pregnancy on the menstrual cycle to be included. Include pituitary/gonads.
	9.4 outline the mechanism for bringing gametes together, their fusion and the development of the embryo in humans;	Include implantation, functions of the amnion, placenta and umbilical cord.

	9.5 discuss the advantages and disadvantages of various methods of birth control;	For example, natural, barrier, hormonal and surgical methods. Consider social aspects.
	9.6 discuss the transmission and control of Acquired Immune Deficiency Syndrome (AIDS) and gonorrhoea;	Implications of sexually transmitted infections (STI's). Include causative agents. Mention prevention, treatment and control. Research and interpret Human Immunodeficiency Virus (HIV) incidence data in the Caribbean. Genetic variation, mutations, natural selection, evolution.
	9.7 relate the parts of a flower to their functions; 9.8 compare the structure of an insect pollinated flower and a wind pollinated flower;	Knowledge of: petals, sepals, anther, filament, stigma, style, ovary, ovules, embryo sac, micropyle and carpel required. Names of pollinating agents required.

	9.9 distinguish between the processes of pollination and fertilisation;	Means by which male and female gametes are brought together and their fusion to form the zygote of a flowering plant. Include cross and selfpollination.
	9.10 explain how fruit and seed formation occur after fertilization;	Knowledge of the processes in dicotyledon plants only.
DISEASE	9.11 describe fruit structure including adaptations for fruit and seed dispersal.	At least one example of water, wind, mechanical and animal dispersal methods. Mention the importance of Dispersal . Draw examples of fruits and seeds to show adaptations for dispersal
	10.1 distinguish among pathogenic, deficiency, hereditary and physiological diseases;	Include examples of each.

	10.2 identify the stages in the life cycle of a mosquito; Include habitat and mode of life of each stage.	Collect eggs and larvae of mosquitoes. Make observations and drawings of complete metamorphosis.
	10.3 discuss the role of the mosquito as a vector in the transmission of pathogenic diseases;	
	10.4 suggest appropriate methods of control of each stage of the life cycle of mosquito;	
	10.5 discuss the treatment and control of the four main groups of disease; Knowledge of malaria, dengue, yellow fever required.	The role of diet and exercise in controlling physiological diseases: hypertension and diabetes to be included. Knowledge of insulin and glucagon required.
	10.6 discuss the social, environmental and economic implications of disease with reference to both plant and animal diseases.	Emphasize loss of productivity, loss of human life, livestock and agricultural crops.

CONTINUITY AND VARIATION **MITOSIS**	1.1 distinguish among DNA, chromosomes, genes and alleles;	DNA (deoxyribonucleic acid) as nucleic acid that contain all genetic information. Gene as a portion/segment of DNA that carries information to produce a specific protein. Chromosome as DNA and protein (histones). Haploid as the 'n' number of chromosomes. Diploid as the '2n' number of chromosomes. Alleles as two or multiple forms of the same gene. Construct models of the structure of DNA and chromosomes. Relationships between gene; allele; DNA; chromosome protein.
	2.1 describe the process of mitosis;	Emphasis on its importance for maintaining species chromosome number. Mention the replication of chromosomes. Names of stages are not required.

	2.2 explain the role of mitosis in asexual reproduction;	Include at least two examples of asexual reproduction in plants such as sugarcane cuttings and Bryophyllum leaves.
	2.3 explain why asexual reproduction gives rise to genetically identical offspring;	Cloning as the reproduction of populations of genetically identical individuals.
MEOSIS	2.4 describe the process of meiosis;	Simple treatment to include only homologous pairs, crossing over, separation of homologous chromosomes and subsequent separation of chromatids. Names of stages not required.
	2.5 state the importance of halving of chromosome number in the formation of gametes;	
	2.6 explain the role of meiosis in the transmission of inheritable genetic characteristics;	Role of crossing over random assortment and recombination in genetic variation (benefits of sexual reproduction).

HEREDITY AND GENETICS	2.7 explain the meaning of the following terms: dominant trait, recessive trait, codominance, genotype, phenotype, homozygous and heterozygous;	Codominance: blood group inheritance
	2.8 explain the inheritance of traits (dominant and recessive genes);	Examples to include Sickle cell anaemia, and albinism. Genetic diagrams required.
	2.9 predict the results of crosses involving one pair of alleles in the heterozygous, homozygous dominant and recessive conditions;	Include Punnet squares and pedigree charts to show dominant, recessive and codominant traits. Include genotypic and phenotypic ratios. Students should be able to identify the various phenotypic ratios obtained from crossing homozygous and heterozygous parental genotypes.
SEX LINKED DETERMINATION AND SEX LINKED DISEASES	2.10 describe the mechanism of sex determination and inheritance of sex linked diseases in humans;	Include example of sex linked disease such as haemophilia and colour blindness.

VARIATION AND EVULOTION	3.1 explain how genetic variation arises;	Sexual reproduction; mutation.
	3.2 explain why genetic variation is important;	Variation makes it less likely that a change in environmental conditions will wipe out an entire species.
	3.3 distinguish between continuous and discontinuous variation in populations;	Example: foot size, presence or absence of horns in cattle, pod size, tongue rolling, and leaf size. Mention genetic and environmental effects. Carry out a survey on appropriate characteristics; for example, observe and record the range of variation in a particular feature of any kind of organism.

NATURAL SELECTION	4.1 define a species;	4.1 define a species; Include biological species concept (group of closely related organisms that are able to interbreed and produce fertile offspring). Give examples of species of birds, plants that can interbreed. When two unrelated species mate, their offspring are not viable or if survive will be infertile, for example, the mule.
	4.2 describe how new species are formed;	Two types: -Speciation caused by physical geographic separation such as a river forming, colonizing a new island or rise of a mountain range (occurs with loss of habitat or the formation of new habitat); –Speciation caused by ecological and behavioral differences such as courtship behaviour/ differences in coloration. Note: Over time, species can also go extinct due to hunting/habitat loss/disease, for example, Caribbean Monk Seal.

	5.1 explain how natural selection plays a role in biological evolution; *population.*	Natural selection as a process by which a population retains those genes which makes it adapted to its habitat. Natural selection normally preserves useful adaptations. Relate genetic variation to natural selection (variation provides the template for natural selection to act on). Mutation. **Research how natural selection has played a role in the evolution of cassava plants, sea turtles, and Caribbean lizards.** The peppered moth, the Galapagos finches, bacterial resistance to antibiotics, pesticide resistance; the radiation of the Caribbean lizards. Use other local examples. For example, flower coloration: If a goat is attracted to red flowers and eats 75% of red flowers

		compared to the pink flowers in population, it acts as the selective force that leads to changes in the overall genetic diversity of the plant
	5.2 distinguish between natural and artificial selection;	*Mention plant and animal breeding. Humans select traits to suit their needs. Cite local examples.*
	6.1 describe how genetic engineering can be used to change the traits of an organism;	Changing the traits of one organism by inserting genetic material from a different organism. *Include food production and medical treatment. For example, insulin production and incorporation of beta carotene producing gene in rice for areas that are affected by night blindness.*
	6.2 discuss the possible advantages and disadvantages of genetic engineering.	Social, ethical and ecological implications; Fingerprinting, DNA tests, gene therapy, captive breeding programmes.