

C A R I B B E A N E X A M I N A T I O N S C O U N C I L

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN SECONDARY EDUCATION CERTIFICATE[®] EXAMINATION**

MAY/JUNE 2012

**HUMAN AND SOCIAL BIOLOGY
GENERAL PROFICIENCY EXAMINATION**

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GENERAL COMMENTS

The 2012 examination was the eighth June sitting of Human and Social Biology, offered at the General Proficiency level.

The format of the examination was different from that of previous years. There was no change to Paper 01 which consisted of 60 multiple-choice items. However, Paper 02 now consists of six compulsory questions, four of which are structured (Section A) and two of which are essay questions (Section B). Each question is worth 15 marks. Teachers should note the following:

- The four structured questions are longer and a single question attempts to integrate several areas of the syllabus.
- The questions in this paper assume that students would have benefitted from the opportunities of learning, provided by field trips and laboratory work.
- There has been little change to the essay components.
- Teachers should be mindful that Question 1 in Paper 02 will always involve the analysis of data.

DETAILED COMMENTS

Paper 01 — Multiple Choice

Candidate performance was fair; there was a decline when compared to the previous years. The topics that posed the most difficulties for the candidates were as follows:

- Nitrogen-fixing bacteria in the nitrogen cycle
- The formula for calculating body mass index (BMI)
- The structure of red blood cells
- Food tests
- Methods used to correct short sightedness
- Similarities of the life cycles of the mosquito and housefly
- The means by which water enters the atmosphere in the water cycle

Paper 02 — Structured Essays

Question 1

This data-analysis question tested candidates' knowledge of the respiratory system and the effect of tobacco smoke on it. Performance was fair.

For Part (a), many candidates were able to identify the *trachea*, the *left lung* and the *diaphragm* in the diagram given on the paper. They also located the alveolus, and described its structure as related to its function for Part (b).

For Part (c), candidates were given a bar chart with data about smoking and the incidence of lung cancer. In Part (c) (i), candidates were asked to state the year in which the total number of smokers was the highest. A number of candidates gave a range of years instead of a single year.

For Part (c) (ii), candidates were asked to state the period in which there was the greatest increase in the total number of smokers. Most did not give the period, 1970–1980.

A comparison of the pattern of smoking in men and women between 1990 and 2000 was required for Part (iii). This was not well done; candidates quoted numbers without relating the numbers to the time period.

For Part (iv), candidates were asked to compare the pattern of cancer in females to that of smoking in females. Some candidates compared smoking in males with smoking in females or wrote about males instead of females.

Parts (v) and (vi) were moderately well done as most candidates were able to suggest reasons for the pattern of smoking seen in men and women, respectively.

Recommendations to Teachers

Teachers need to provide students with sufficient practice to enable them to understand graphs and analyse data. This can be done using relevant topics within the Human and Social Biology syllabus.

Question 2

Candidates' knowledge of food chains, energy relationships, the carbon cycle and photosynthesis was required. This question was poorly done.

Part (a) (i) required candidates to construct an aquatic food chain using three organisms from a coral reef. The responses indicated that many candidates did not respond satisfactorily to this part of the question. Many used freshwater fish instead of marine fish. Some drew arrows in the wrong direction or used lines instead of arrows. Some did not begin the food chain with the producer, a *water plant*. A few candidates produced terrestrial food chains.

In Part (ii), most candidates were able to identify the herbivore from the food chain they produced in Part (a) (i).

For Part (iii), most candidates knew that the *first trophic level* usually contains the largest number of organisms, and some correctly discussed energy losses between trophic levels in Part (iv).

Candidates were expected to complete a sentence using the words 'parasite' and 'predator', in Part (b). Many gave **examples** of parasites and predators rather than supplying the appropriate terms.

Part (c) required candidates to write an equation for photosynthesis and explain what would happen if all the plants in the world were destroyed. Most knew the equation for photosynthesis, and, as part of their discussion, stated that *animals depended on plants for food, hence humans as well depended on plants*.

Recommendations to Teachers

Students seemed to be ignorant about reefs and the types of organisms that inhabit them. Videos on nature, visits to marine research stations and presentations done by marine biologists would provide candidates with more exposure to marine life.

Question 3

This question tested candidates' knowledge of the nervous system. Performance was poor.

For (a), many candidates were able to name the two subdivisions of the nervous system, namely the *central nervous system* and the *peripheral nervous system*.

Part (b) (i) required candidates to label an axon and a nerve ending, given the diagram of a neurone. Most mistook the nerve endings for dendrites and consequently gave an inappropriate answer for the role of the nerve endings, as required in Part (ii). For example, many candidates responded that the axon acted as a pathway for nerve impulses and did not state the direction of the nerve impulse.

In Part (c), some candidates knew that the *hypothalamus* was responsible for intermittent fever, and the *medulla oblongata* for irregular heartbeat and breathing.

Candidates were also able to explain differences between and give examples of voluntary and involuntary actions, in Part (d).

For Parts (e) (i) and (ii), very few candidates were able to name and spell neurotransmitter correctly. Some stated that neurotransmitters crossed the synapse but failed to mention what their post-synaptic role involved, that is, *they cause an impulse to flow in the other neurone*.

Recommendations to Teachers

Teachers should encourage students to make models of nerves and the brain and use them to explain the roles of each region. Videos illustrating nervous transmissions and functions of nerves can be accessed on the Internet.

Question 4

This question tested candidates' knowledge on genetic engineering, atherosclerosis and hypertension. Candidates performed poorly.

In Part (a), most candidates were unable to properly define the term 'genetic engineering'. For example, candidates wrote that 'Genetic engineering is when you make something stronger, when genes are passed from mother to child, where organisms can be produced or improved without the use of sexual reproduction, and a modern way in which food is produced for human consummation'. A good answer would have been *Genetic engineering is the direct manipulation of an organism's genetic material in a way that does not occur under natural conditions*.

Part (b) required candidates to explain biotechnology involving recombinant DNA. Responses were poor. Most candidates were unable to state how insulin is made through genetic engineering. A good response would have been as follows: *The gene which codes for insulin production is removed from a human chromosome using enzymes. It is then placed in the plasmid of E. Coli. The bacterium in which it is placed then begins to manufacture insulin*.

In Part (c), candidates were required to state one advantage and or disadvantage of using genetic engineering for food production. While advantages such as *pest-resistant crops, higher yields and better quality crops* were known, most candidates were unable to correctly state a disadvantage. Some poor responses included: ‘death’, and ‘hormones affecting growth’. Moral implications of genetic engineering were stated but not accepted as a correct response. A disadvantage is that *introducing genetically modified genes could produce disastrous results yet unknown.*

For Part (d) (i), candidates should have stated that atherosclerosis is a condition which occurs when fat is deposited on the walls of the arteries thus reducing the internal diameter of the artery. For Part (d) (ii), most gave at least one effect of hypertension on the cardiovascular system. Responses to Part (d) (iii) were better. Most candidates were able to suggest at least two lifestyle changes which could be made in order to control hypertension.

Recommendations to Teachers

Teachers should use diagrams when teaching about the procedure for genetic engineering. Emphasis should be placed on the use of biotechnology/genetic engineering through projects, debates and Internet research.

Question 5

This question tested candidates’ knowledge of the endocrine system, the hormonal control of reproduction and the nervous system. Candidates did not seem to know these topics very well.

In Part (a), candidates were asked to name the hormones produced by the thyroid and adrenal glands. Most were able to state thyroxin and adrenaline respectively. They were also able to state the functions of these hormones.

For (b) (i), the hormones produced by the pituitary, *follicle-stimulating hormone (FSH)* and *luteinizing hormone (LH)*, affect both the testes and the ovaries. Candidates did not know the negative effects of underproduction of these hormones (FSH and LH) either on the human body, required for Part (b) (ii), or on the Ukraine population presented in the stimulus, as required for Part (b) (iii).

In Part (c), candidates were unable to make good comparisons between the nervous and endocrine systems. For example, candidates wrote that the nervous system was controlled by the brain whereas the endocrine system controlled the rest of the body; the nervous system was at the top whereas the endocrine system was at the bottom; the nervous system has two main divisions whereas the endocrine system has many parts and the nervous system deals with external whereas the endocrine system deals with the internal. Examples of good comparisons would have been: *In the nervous system, messages are sent via impulses whereas in the endocrine system messages are sent via hormones; the nervous system tends to work quickly whereas the endocrine system is generally slow.*

Recommendations to Teachers

Teachers should encourage students to learn the endocrine hormones and the organs within which they are made. Teachers should also show the inter-relatedness between various topics and world events especially as they relate to environmental issues and their effects on human health. Students should also be taught how to make comparisons with the use of tables.

Question 6

This question assessed candidates' knowledge and understanding of diseases and vaccines. Performance was fair.

Candidates were able to name the vector responsible for dengue fever, and to give signs or symptoms of dengue fever, for Part (a) (i). They also correctly stated measures which health authorities and households could take to control the spread of dengue fever, for Part (a) (ii).

Responses to Part (b) were fair. Too many candidates were not aware that the vector of malaria is the *Anopheles* mosquito. Some of the misconceptions included: coughing, sneezing, touching and sexual intercourse as well as transmission through eggs during reproduction. A good response was:

Mosquitoes acquire the pathogen (plasmodium) when they bite and feed on the blood of an infected person. They then transmit the plasmodium when they bite another person.

Part (c) required candidates to explain how the knowledge of passive and active immunity may be used to protect an individual from contracting malaria. Candidates were also expected to compare the advantages and disadvantages of the approaches. Most candidates limited passive immunity to the passage of antibodies from mother to child during breastfeeding which was not relevant to malaria.

Most candidates demonstrated a lack of knowledge about the concept of immunity. Others misinterpreted the question giving suggestions of preventative measures. Some of the candidates who demonstrated a good grasp of the concept of immunity confused the terms active and passive. The terms antibodies, antibiotics and antigens were commonly used incorrectly or interchangeably.

A good response would have been as follows:

In passive immunity, antibodies to a particular disease are given as a vaccine. If the body becomes exposed to the antigens, the antibodies will immediately attack and destroy them. Unfortunately, the antibodies given will eventually be lost from the body and the person will once again be susceptible. In active immunity, the person is exposed to a weakened form of the pathogen. The body responds by producing antibodies. When the body encounters the real disease, it activates its antibodies' production more quickly.

Recommendations to Teachers

Teachers could utilize the services of health professionals to speak to the students on diseases in general. They should also encourage research work. Dramatization could also be explored as a possible means of learning about the diseases.