

**CARIBBEAN EXAMINATIONS COUNCIL**

**REPORT ON CANDIDATES' WORK IN THE  
SECONDARY EDUCATION CERTIFICATE EXAMINATION  
JANUARY 2010**

**HUMAN AND SOCIAL BIOLOGY  
GENERAL PROFICIENCY EXAMINATION**

**Copyright ©2010 Caribbean Examinations Council ®  
St. Michael, Barbados  
All rights reserved**

## GENERAL COMMENTS

The 2010 examination, offered at the General Proficiency Level, was the fifth January sitting of Human and Social Biology.

The format of the examination was the same as in previous years. Paper 01 consisted of 60 multiple-choice items. Paper 02 consisted of ten compulsory structured questions in Section A and four essay questions in Section B, of which candidates were required to answer any two.

The overall performance of candidates improved when compared with the January 2009 examination. The percentage of candidates achieving Grades I–III was approximately 50.7 when compared with 44.93 per cent for January 2009.

However, an assessment of the individual performance of Papers 01 and 02 found that there was a decrease in the performance of candidates on Paper 01 and an increase in the performance on Paper 02. The analysis showed that there was an improvement in the Use of Knowledge skill (UK), and a decline in the Knowledge and Comprehension skill.

## DETAILED COMMENTS

### Paper 01 – Multiple Choice

Candidate performance declined in 2010. Responses showed that candidates had difficulties with the following topics:

- The structure of the plant cell
- Comparison of the plant and animal cells
- Nature of the transmission of nerve impulses at synapses
- Function of the lymphatic system
- Cardiovascular system
- Renal system
- Reproductive system
- Determination of genotypes

### Paper 02 – Structured/Essay Questions

#### Question 1

This question tested candidates' understanding of the structure of the plant and animal cell, as well as the function of organelles. Also tested was the causative agent of ringworm, its associated signs and symptoms, good hygiene practices to avoid its occurrence and possible treatment.

Candidates' responses indicated that they knew the functions of the cell organelles but were unclear as to the organelles common to bacteria, plant cells and animal cells.

Candidates showed knowledge of the signs and symptoms of ringworm, even though at times there was still confusion between the two terms. They were also aware of possible forms of treatment and were able to name over-the-counter medications.

It is recommended that candidates read the questions carefully and follow instructions explicitly.

### Question 2

This question tested candidates' understanding of the process of photosynthesis, sources of major nutrients, the use of major nutrients in the human body and the carbon cycle.

Candidates were able to identify the sources of carbohydrates and proteins and knew the functions of these nutrients in the human body. Unfortunately, it appears that many of them did not read the questions carefully and stated sources of these nutrients that were animal-based instead of plant-based. Most candidates were knowledgeable about the return of carbon dioxide to the atmosphere.

Candidates seemed to have difficulty in correctly stating the word equation for photosynthesis. Many believed that oxygen and water give glucose and energy. Many candidates were also unaware of the storage form of sugar in plants.

### Question 3

There were three main parts to this question. Part (a) required candidates to label a diagram of the thoracic cavity; Part (b) involved defining a reflex action and giving examples of such an action based on a scenario, while Part (c) focused on the image formation associated with long-sightedness and the type of corrective lens that should be used in such situations.

Responses were satisfactory for Parts (a) and (b) except that candidates did not include that reflex actions are involuntary actions. Very few candidates were able to accurately show by drawing where the image is formed during long-sightedness and most did not know the difference between a convex and a concave lens.

Candidates should again be encouraged to read the question carefully. For example, when asked to choose between two examples given as to which was a voluntary and which was a reflex action, candidates gave their own examples.

### Question 4

This question tested candidates' knowledge of the main blood vessels of the heart, the importance of a circulatory system to humans, the effect of a deficiency of iron and how it affects the transport of oxygen by red blood cells, and signs/symptoms associated with that deficiency.

While candidates knew the names of the blood vessels, most were unable to accurately label the structures identified. Candidates also confused 'iron' with 'iodine'.

Candidates were unable to explain why a circulatory system was necessary in the human but not necessary in the amoeba. Most were unaware of the concept of surface area to volume ratio. Candidates were also unable to link a deficiency of iron with a lack of haemoglobin.

Some common misconceptions were:

- Iron strengthened the blood, therefore, insufficient iron makes the blood weak and cells unhealthy.
- Insufficient iron resulted in reduced red blood cells which were ‘outnumbered’ by the white blood cells.
- Lack of iron reduced the transport of oxygen by the red blood cells causing shortness of breath.
- Lack of iron caused a reduction in haemoglobin which affected the shape of the red blood cells.

It is recommended that PowerPoint lectures be used so that students have a visual representation of the connection between iron/haemoglobin/red blood cells.

#### Question 5

This question involved the labelling of structures of the skin and the skin’s involvement in sweating, in addition to the role of the kidney in the homeostasis process.

Most candidates were able to explain that excess water is lost by the skin as a result of sweating but were unable to accurately label a diagram of the skin, mistaking the dermis for the epidermis. They also attributed the ‘flushed’ appearance to the sun’s heat, blood vessels moving closer to the surface of the skin and an allergic reaction to the grass. They also believed that sweat cools down the body instead of the evaporation of sweat cooling down the body.

#### Question 6

This question tested the candidates’ knowledge of asexual reproduction and its genetic consequences. It also required use of knowledge on abortion and contraceptive methods.

Most candidates were familiar with the association of mitosis and asexual reproduction but were unaware of plants using bulbs as a method of asexual reproduction.

While candidates were relatively comfortable with tubal ligation, most thought the ‘rhythm’ method involved ‘beat’ as it relates to music and were unable to differentiate between the rhythm and withdrawal methods.

#### Question 7

This question required candidates to differentiate between genetic and environmental variation, the benefits of genetic variation, the chemical that forms a gene and how gender is inherited in humans.

Most candidates knew the chemical that forms a gene but were unable to differentiate between genetic and environmental variation. Very few were able to state the gametes derived from the male and female and, therefore, were unable to show the gender of the resulting offspring.

This topic continues to pose a major problem for candidates. It is therefore strongly recommended that this topic be taught during Form 4 and that it be thoroughly revised before the examination date. Perhaps scenarios/skits could be developed so that candidates have a visual representation of what occurs during the process of gender determination.

### Question 8

This question tested candidates' knowledge and use of knowledge of the cause, symptoms, and treatment of dengue fever and methods of controlling rats.

Most candidates knew the vector responsible for the transmission of dengue, its symptoms and methods of controlling rats. However, many candidates stated that the microorganisms responsible for causing dengue fever were bacteria, mosquitoes and protozoa. They also stated that the use of antibiotics and vaccinations were recommended for treating dengue fever.

The correct spelling of terms also continues to be a major problem.

It is recommended that lessons pay special attention to the correct spelling of biological terms. Lectures/ discussions could also be conducted on these diseases and their effects on the community, and the use of audiovisual aids/puzzles/worksheets be used to enhance learning.

### Question 9

This question tested candidates' understanding of two of the most common sexually transmitted infections; their mode of transmission; effects on developing foetuses; the change in human behaviour that may have resulted in the increase of sexually transmitted infections; and advice that could be given to teenagers so as to reduce the spread of sexually transmitted infections.

Candidates were able to give advice on reducing the spread of sexually transmitted infections but gave erroneous responses such as transmission via kissing, and sharing of clothing and utensils.

Candidates were unaware of the effect of gonorrhoea on the developing foetus and believed that it was the mixing of blood and not the transmission of the virus that caused the damage to the developing foetus.

It is recommended that accurate information be given to candidates via classroom lectures/discussions because a lot of knowledge that candidates possess is learnt 'off the streets'. Emphasis should also be placed on the fact that it is contact between broken skin and virus-contaminated blood that is responsible for the contraction of HIV.

### Question 10

This question dealt with pollutants, their origin and effects; method of purification of water using specific materials and diseases contracted from water-borne pathogens.

Most candidates were able to give boiling as a method of purifying water but were unable to establish the link between simple distillation and the apparatus shown in the question.

While candidates were knowledgeable on pollutants, most were unable to identify lead as the pollutant from car exhaust which is toxic to the nervous system.

It is recommended that more practical teaching methods be employed so as to emphasize the social effects of the concepts mentioned in this question.

### Question 11

This question focused on nutrition, food groups, digestion and absorption of nutrients.

Candidates were very knowledgeable about balanced diets and sources of vitamin A, although they were unaware that a lack of Vitamin A causes night blindness.

Most candidates were unable to accurately draw the digestive system and were unable to discuss the stages of protein digestion and absorption of amino acids.

It is highly recommended that charts, diagrams and visual aids be employed in the teaching of this topic. Candidates should also be taught how to draw and label diagrams.

#### Question 12

This question required candidates to give the functions of the testes, prostate and ovary; to identify the dates on which different aspects of the menstrual cycle occur; and the benefits of family planning.

Most candidates were knowledgeable about the functions of the reproductive system and the benefits of family planning. Unfortunately, most were of the opinion that the baby developed in the ovary; that fertilization occurs in the ovary and that the prostate gland produces sperm. Candidates also erroneously thought that family planning prevented the spread of sexually transmitted infections.

It is strongly recommended that more innovative methods be utilized to fully explain the reproductive process and to clear up these common misconceptions.

#### Question 13

This question tested candidates' knowledge of the structure and functions of the respiratory system under normal and stressful conditions.

Candidates were very conversant with mouth-to-mouth resuscitation and the signs/methods of the spread of tuberculosis but were unable to correctly label the diagram of the respiratory system and define the term 'vital capacity'. They were also unable to suggest factors, other than illness, that could affect breathing rate.

It is recommended that models be used to teach the systems of the human body. Presentations/discussions/lectures could be given on the breathing process and factors that affect its rate. First aid personnel could also be employed to give demonstrations on the practical aspects of first aid.

#### Question 14

This question tested candidates' knowledge on herbivores, carnivores and omnivores; primary producers; food chains; the adverse effects on pesticides; the advantages of using biological control and their effects on the food chain.

Most candidates were able to correctly define the terms mentioned in the question. However, they defined the term 'primary producer' as a Social Studies candidate should. When drawing food chains, candidates are still unsure of the direction in which the arrows should be drawn.

Candidates also believe that insecticides affect plants and not insects and were unable to analyse the food chain and the effects of biological control on it.

It is recommended, therefore, that deductive reasoning methods be employed when teaching this topic. Projects could also be given to candidates whereby they could study the school's garden/playfield and develop a species list, identify niches and construct food chains. Trophic levels could also be identified and compared. Field trips could be made to farms and discussions held with farmers as to their methods of pest control and the possible effects on the environment.