

‘CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES’ WORK IN THE
SECONDARY EDUCATION CERTIFICATE EXAMINATION**

JANUARY 2011

**HUMAN AND SOCIAL BIOLOGY
GENERAL PROFICIENCY EXAMINATION**

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GENERAL COMMENTS

The 2011 examination was the sixth January sitting of Human and Social Biology, offered at the General Proficiency level.

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.

Candidate performance declined in 2011. Fifty-one per cent of the candidates achieved Grades I–III in 2011, while 54 per cent achieved Grades I–III in 2010. This decline in performance was evident in both Paper 01 and Paper 02.

DETAILED COMMENTS

Paper 01 – Multiple Choice

Candidates had difficulties with the following topics:

- Identification of the region where a neurotransmitter is released on arrival of an impulse
- Adaptations of the villi to facilitate absorption
- Identification of a fixed joint
- Function of endocrine glands
- Definition of a landfill

Paper 02 – Structured and Extended Essays

Question 1

This question tested candidates' knowledge of infectious diseases, the pathogens which cause them, the differences between bacteria and viruses, signs/symptoms of diseases and measures to control their spread.

Most candidates knew the signs/symptoms of the particular disease as well as measures of control. However, most candidates were unaware of differences between bacteria and viruses. Some common misconceptions were: both bacteria and viruses can be cured using antibiotics; bacteria are found outside the body while viruses are found inside the body; bacteria can be seen with the naked eye while viruses cannot.

Suggestions to Teachers

Where possible, diagrams should be used while teaching. Students need to be taught how to determine the differences between bacteria and viruses. It is also strongly recommended that topics which are covered earlier in the year be revisited prior to the examination.

Question 2

This question tested candidates' knowledge of the nervous system and its components; the functions of various areas of the brain, and the effects upon the body when there is insufficient thyroid hormones.

Most candidates knew the components of the nervous system and the effects on the body as a result of insufficient thyroid hormones. They were, however, unable to correctly label the hypothalamus, and instead of using the words cerebrum and cerebellum, quite a few candidates used the terms, forebrain and hindbrain.

Some common misconceptions were the reference of goitre as a result of overproduction of thyroxine and that damage to the hypothalamus affects one's ability to balance.

Suggestions to Teachers

Correctly labelled charts and diagrams should be used to ensure that students know the exact location of structures in the brain. Drawing activities along with labelling and annotating of diagrams should be done on a regular basis.

Question 3

This question was fairly well done. It tested candidates' knowledge of the function of blood as well as the function of the components of blood.

Most candidates were able to give two functions of blood and were well aware of the differences between white and red blood cells. While candidates were aware of the function of platelets, they were unable to say how they can be identified on a blood smear.

Some common misconceptions involved using the terms atherosclerosis and arteriosclerosis interchangeably and some candidates confused atherosclerosis with arthritis. Candidates also stated that platelets were fragments of blood, and not fragments of blood cells.

Suggestions to Teachers

Teachers must include brainstorming questions during the teaching/learning process. Drawing and labelling of diagrams should be done on a regular basis. PowerPoint presentations should also be used so that students will have a mental picture of the concepts being taught.

Question 4

This question was poorly done. It tested candidates' knowledge of the respiratory system, the logistics of mouth-to-mouth resuscitation and a respiratory infection (influenza).

Candidates were able to name the organism that causes influenza, say how it is spread and identify signs/symptoms associated with it. However, they were unable to correctly label the region of the lung where gaseous exchange takes place and were completely unaware of the reasons associated with the actions involved in mouth-to-mouth resuscitation.

Some common misconceptions included pressing down on the victim's chest during mouth-to-mouth resuscitation being necessary in order to get the heart pumping and to remove water from the lungs. Candidates also believed that H1N1 causes influenza.

Suggestions to Teachers

Teachers should place emphasis on proper labelling of diagrams. Members of the Red Cross Society could be invited to schools in order to demonstrate life-saving skills such as CPR and mouth-to-mouth resuscitation.

Question 5

This question was relatively well done. It tested candidates' knowledge of the functions of nutrients in the body, what is meant by a balanced diet and the major mineral needed for proper growth of teeth and a vegetable source for this nutrient.

Most candidates knew the functions of the nutrients and were able to differentiate between a balanced and an unbalanced diet. However, quite a few candidates used the terms food and nutrients interchangeably and were of the opinion that a balanced diet consists of only the macro-nutrients.

Suggestions to Teachers

Teachers need to emphasize the importance of linking nutrients to their sources as well as the differences between food groups and nutrients.

Question 6

This question tested candidates' knowledge of the production of oestrogen and its function, the stages of the birth process and the causes of growth deficiencies associated with babies while developing in the uterus.

This question was not well done, in spite of the fact that diagrams were used to guide the candidates into giving appropriate responses. Few candidates knew the organ responsible for the production of oestrogen and were equally unaware of its (oestrogen) function.

While most candidates were aware of a drug that could cause babies to be underweight at birth, almost no candidate knew the term 'foetal alcohol syndrome'.

Some common misconceptions included dwarfism and Down syndrome as growth deficiencies and that oestrogen controlled growth.

Suggestions to Teachers

Teachers should encourage students to be specific when answering questions and avoid giving vague responses. Discussions on the components of tobacco should also be encouraged so that students are made aware of the effects these components have on developing babies. Charts and diagrams can be utilized while teaching reproduction so that students fully understand the birth process.

Question 7

This question was poorly done overall. It tested candidates' knowledge of the use of terms associated with genetics, the number of chromosomes associated with muscle cells in the human body and the inheritance of height in humans.

Most candidates were unable to explain the common terms associated with the study of genetics and were totally unaware of the chromosome number found in somatic cells of humans. The section of the genotype from the genetic cross diagram was relatively well done and most candidates performed relatively well on this section.

Suggestions to Teachers

It is suggested that concepts be reviewed and reinforced and terms such as 'chromosome' and 'heterozygous' be well explained. Still more emphasis should be placed on Punnett squares and being able to explain the results obtained from such diagrams.

Question 8

This question was relatively well done. It required candidates to define the term 'vector'; give an example of a vector; outline measures to control the spread of leptospirosis and a method of treatment; state how AIDS could be confirmed; identify signs/symptoms of this disease and explain how the virus that causes it could be spread.

Candidates were very knowledgeable about AIDS and most of them scored full marks on this section of the question. Unfortunately, most candidates are still unaware of what a vector is. This occurs in spite of this question being asked quite often. The misconception that vectors are carriers of disease instead of being carriers of the organism that causes the disease still occurs to a high degree.

Suggestions to Teachers

More intensive teaching needs to be done on this topic. It is suggested that it be done early and referred to as it arises in other topics. Students should be allowed to practise working out genetic crosses and encouraged to learn definitions of genetic terms.

Question 9

This question was poorly done. It tested candidates' knowledge of diseases and their impact on humans, and the impact of health practices on the environment and immunity.

Candidates correctly answered questions on the meaning of the term 'sterilization' and two methods of sterilizing food. They were also aware of the effect of chlorine on drinking water. However, they were unable to explain the function of chlorination in large-scale water purification. The section on artificial passive versus artificial active immunity was not well done. Most candidates failed to make true comparisons of the two types of immunity. There were no misconceptions associated with immunity. Candidates simply did not know the answers.

Suggestions to Teachers

More time needs to be spent teaching this topic. Field trips/visits by resource personnel should be encouraged as this would promote more discussion on the topic. Regarding immunity, students could make charts and place them on science notice boards or on the walls of the labs and constant reference could be made to these charts.

Question 10

This question was relatively well done. It tested candidate's knowledge of structures common to plant and animal cells and the process of osmosis and diffusion.

Most candidates were able to list structures common to plant and animal cells. Regarding the explanation of the term osmosis, candidates continued to omit the very necessary part of the explanation that it is the movement of water molecules from an area of high concentration of *water molecules* to an area of low concentration of *water molecules* through a selectively permeable membrane. Most candidates got the marks for movement of water molecules through a selectively permeable membrane but consistently lost a mark for omitting 'water molecules'. This is a misconception that continuously occurs.

Suggestions to Teachers

Students should be encouraged to carefully read questions before responding because the majority of them did not respond to Part b (i).

The terms 'osmosis' and 'diffusion' should be carefully explained by using charts or even by performing skits during class sessions in order to make the material more interesting.

Question 11

This question was moderately done. It tested candidates' knowledge of diabetes mellitus, hypertension and obesity. There was also a section in which a graph was used to show the relationship between obesity and diabetes mellitus.

Candidates were unable to explain what was meant by the term 'diabetes mellitus'. Some common misconceptions associated with this disease were that diabetes and obesity are contagious diseases; that diabetes develops because the body stops producing sugar; and that the pancreas is a hormone.

The section on the graph was poorly done. This shows that candidates are still unable to properly understand graphs and answer questions related to them.

Candidates were unable to properly explain how obesity may affect blood pressure. They spoke about fat being laid down on arteries; fat covering the heart and generally being everywhere *except* on/in the walls of the arteries.

Suggestions to Teachers

Students should be encouraged to use rulers while answering questions related to graphs. They should be encouraged to carry rulers with them to an examination. More emphasis should be placed on differences between hormones and the organs that produce them.

Health care professionals should be invited to schools so that lectures on lifestyle diseases and their causes can be properly explained and discussed.

Question 12

This question was moderately done. It tested candidates' knowledge of landfills; activities involved in treating solid waste at landfills; the processes of incineration, recycling and composting and advantages associated with them; and how water pollution could be prevented.

Most candidates were able to list methods used to prevent water pollution. Those who earned marks did so from this section as they were able to state three methods. Some candidates however, responded in terms of water purification methods. Those types of responses were not accepted.

Candidates were unable to explain the processes involved in creating a landfill. Most candidates described the formation of a pit latrine while attempting to explain how a landfill is formed. Candidates were able to explain the processes of incineration, recycling and composting. However, they were either unable to give advantages associated with each of those processes or their attempts at giving advantages were too superficial. Suitable answers should have included "production of heat to generate electricity" as an advantage for the incineration process, for example. A common misconception about recycling was that it saves costs. The correct answer should have been that it saves resources.

Weaker candidates mentioned water purification methods and/or methods of cleaning water after pollution has occurred instead of discussing preventative methods.

Suggestions to Teachers

Teachers should allow ample time for teaching this topic properly, as very often it is assumed that the topic is widely/commonly known. Field trips to landfills, sewage plants, recycling plants and garbage dumps should be planned in order to reinforce what is taught in the classroom. Students should be encouraged to do practice questions on these topics, thus guiding them into giving responses with sufficient depth.

Question 13

This question was moderately done. It tested candidates' knowledge of the kidney; the formation of urine; the effects of alcohol on the liver; and social effects that arise as a result of alcoholism.

Most candidates were able to correctly label the diagram of the nephron of the kidney and to state the functions of the labelled parts. However, they were unable to correctly explain the

terms ‘ultra-filtration’ and ‘selective re-absorption’. These terms were used interchangeably by most candidates.

Candidates were knowledgeable about the functions of the liver and were fully aware of the physiological and social effects of alcoholism.

Suggestions to Teachers

Teachers should use more visual aids when demonstrating how urine is formed.

Question 14

This question tested candidates’ knowledge of various hormones and their functions; sexual versus asexual reproduction and their advantages; how semen is produced; and the advantages associated with teenage pregnancy.

Most candidates responded well in the section on pregnancy among teenagers and were able to identify variation as an advantageous outcome of sexual reproduction. Spontaneous abortion was also accurately linked to miscarriages.

Most candidates, however, ignored the section on hormones and where responses were given, they were inaccurate. Hormones were often linked to the onset of sexual activity or described as ‘chemical reactions’ occurring in the body. The regulatory role of hormones was largely ignored and hormones were described as products of exocrine glands.

Sexual reproduction was equated with copulation; asexual reproduction was often linked to persons being single parents.

Regarding the production of semen, few candidates used the diagram given (which was an excellent stimulus) in explaining the production of semen.

Suggestions to Teachers

Teachers need to place more emphasis on the endocrine system, ensuring that there is differentiation between endocrine and exocrine glands. The specific physiological activity of hormones should also be included, for example, adrenaline causes glycogen to be converted to glucose. The role of hormones should be emphasized. The use of case studies and role play might be useful in exploring the consequences of early/unplanned sexual activity.