

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
SECONDARY EDUCATION CERTIFICATE EXAMINATION**

MAY/JUNE 2010

**HUMAN AND SOCIAL BIOLOGY
GENERAL PROFICIENCY**

GENERAL COMMENTS

The 2010 examination was the sixth June 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 in 2010 declined significantly over performance in 2009. Sixty-eight per cent of the candidates achieved acceptable grades, Grades I – III, in 2010 compared with 78 per cent in 2009. This decline in performance was largely due to poor performance on Paper 02, which declined from a mean of 42 per cent in 2009 to a mean of 37 per cent in 2010.

Poor spelling and the lack of use of scientific terms continued to be prevalent. It also seemed that candidates were not reading the questions carefully and, therefore, provided answers that were in no way related to the questions.

DETAILED COMMENTS

Paper 01 – Multiple Choice

Candidate performance on Paper 01 improved in 2010. However, in spite of this overall improvement, responses showed that candidates had difficulties with the following topics:

- *Blood clotting mechanism*
This question tested candidates' knowledge of what is necessary for the conversion of fibrinogen into fibrin. The correct answer was 'Thrombin and Calcium ion', but most candidates chose "Thrombin".
- *Food tests*
This question tested candidates' knowledge of the results of food tests, given four tests and observations.
- *The menstrual cycle*
This item tested candidates' knowledge of the beginning of the cycle. While many candidates knew that the correct answer was 'With the breakdown of the uterine wall', a large percentage chose "At ovulation".
- *Stage of the life cycle of the housefly at which pesticides are most effective*
This item tested candidates' knowledge of the stage of the housefly at which pesticides are most effective. The correct answer is at the "Larval stage", but the majority of candidates chose the "Adult stage".
- *Natural active and natural passive immunity*
This topic was tested using two items. The first involved a young lady having had typhoid as a child, recovering, but never getting it again even after repeated exposure. While most candidates knew that this was "natural active immunity", a large percentage chose "natural passive immunity". The second item involved a baby being born with antibodies to typhoid. The correct answer was "natural passive immunity". However, most candidates chose "natural active immunity".

- *Cost effective methods of disposal of solid waste*

This item tested the most cost effective method of disposal of solid waste. The correct answer was “Using landfills”, however, most candidates chose “Recycling”.

Paper 02 – Structured Essays

Section A comprised ten questions, each worth 10 marks.

Question 1

Mean: 4.78 Standard deviation: 1.92

This question tested candidates’ knowledge of life processes. A graph was used to test candidates’ knowledge of the differences between the growth rates of males and females, it was expected that they would use their knowledge about puberty to help them with this part of the question. They were also required to know the role of the nucleus in mitosis.

Most candidates were able to state the life processes. Some, however used the term ‘breathing’ rather than ‘respiration’ and ‘nutrients’ and ‘digestion’ instead of ‘nutrition’. A diagram was used to test candidates’ knowledge of the position of the nucleus. While most candidates did know this, they did not follow instructions, and so, labelled the entire cell. Some knew the nucleus was responsible for mitosis but did not label the correct organelle and others labelled the nucleus wrongly.

Recommendation to teachers

Where possible, teachers should use diagrams and graphs in teaching. Students need to be taught how to analyse and interpret graphs. PowerPoint presentations could be used to present diagrams and graphs more effectively.

Question 2

Mean 1.61 Standard deviation: 1.67

This question tested candidates’ knowledge of the structure of the eye, the effects of a change in the amount of light in the environment on the eye, and accommodation.

Most candidates were able to label the lens on the diagram of the eye and knew the definition of accommodation. However, they were unable to label the sclera or choroid layer and were generally not able to describe the functions of the rods and cones in the eye.

Recommendations to teachers

Diagrams should be used for students to practise labelling the eye. Videos and practical exercises can be used to show how the eye works.

Question 3

Mean : 4.35 Standard deviation: 2.89

Performance on this question was fair. The question tested candidates' knowledge of joints, muscles, tendons and ligaments. Candidates were able to state the functions of cartilage and its location in the body, for example, at the end of long bones, trachea and earlobe. They were unable, however, to state a difference between tendons and ligaments. A correct response would have been that tendons join muscle to bone, and ligaments join bone to bone.

In Part (b), many candidates correctly identified and located the hinge or the ball and socket joint. Part (c) (i) presented the most difficulty as candidates were unable to give the meaning of the term 'antagonistic muscles'. In Part (c) (ii), they identified the biceps and the triceps but could not explain how these muscles function to facilitate movement.

Recommendations to teachers

To demonstrate how 'antagonistic muscles' work, practical activities, using model arms and interactive videos, could be used. Candidates should be encouraged to use scientific terms in answering questions, for example, 'inelastic' and 'fibrous' instead of 'tough'.

Question 4

Mean: 3.26 Standard deviation: 1.92

This question, which tested candidates' knowledge of active immunity and typhoid was poorly done.

Candidates were able to identify a symptom of typhoid and suggest a drug for its treatment but were unable to differentiate between signs and symptoms of typhoid. Goitre was given as a common symptom of typhoid. Typhoid was confused with thyroid. Organisms that cause typhoid were named as flies, rats, worms and mosquitoes. Candidates were also unable to state the type of drug used to treat typhoid. They used antibodies interchangeably with antibiotics.

Recommendations to teachers

Teachers should place emphasis on the differences between signs and symptoms. Students should be encouraged to learn the scientific names of organisms. Public health personnel could be invited to discuss diseases such as typhoid with candidates.

Question 5

Mean: 4.00 Standard deviation: 2.27

This question tested candidate's knowledge of aerobic and anaerobic respiration, how adenosine triphosphate (ATP) is utilized and the function and sources of vitamin A. It was poorly done.

Candidates knew that vitamin A improve night vision and were also able to name good sources of it. Most candidates were unable, however, to adequately give the meaning of aerobic and anaerobic respiration. They were also unable to name water and carbon dioxide as waste products of cellular respiration, or suggest fats and carbohydrates as substrates that could be used for energy. Most candidates did not know that respiration occurs in mitochondria. Explaining the role of ATP in energy transfer was also difficult for candidates.

A correct answer could have been: *ATP loses a phosphate (P) to release energy (bonds break) for use by the cell; adenosine diphosphate (ADP) is thus formed.*

Recommendations to teachers

Teachers could use multimedia presentations to teach the topic so that candidates can visualize the role of ATP in energy transfer. Students should be encouraged to learn definitions accurately.

Question 6

Mean: 3.48 Standard deviation: 2.43

This question included a graph from which candidates had to answer questions on enzyme action. It tested candidates' knowledge of enzymes present in the stomach and the action of salivary/pancreatic amylase. Overall, the question was poorly done.

Most candidates were able to identify pepsin as one of the two enzymes present in the stomach. They were also aware that starch is broken down by salivary amylase and were able to identify at least one pH value from the graph at which salivary amylase or pancreatic amylase worked best.

A large number of candidates were unable to describe the effect of acidity in the stomach on salivary amylase. Some stated that the enzyme stopped working because of a high temperature, indicating that they did not use the graph to help them. When asked to state the conditions, acidic or alkaline, under which pancreatic amylase worked, Part (b) (iv), many candidates simply stated 'yes' or 'no', even though the two possible answers were in the question. Candidates were also unable to state the chemical – pancreatic juice – that helps provide the ideal pH for pancreatic amylase to function.

Recommendation to teachers

Teachers should give students the opportunity to practise interpreting graphs.

Question 7

Mean: 4.28 Standard deviation: 2.11

This question assessed candidates' knowledge of the male reproductive system, birth control methods and family planning.

Candidates were able to state the effect of prostate cancer on urination. They were also able to state the benefits of family planning. Candidates were unable, however, to label the drawing of the male reproductive system. There was some confusion about how the contraceptive pill and the rhythm method worked.

Recommendations to teachers

It is suggested that models of the male and female reproductive systems be used in teaching. Resource persons from family planning associations should be invited to talk about contraceptive practices and general misconceptions about these practices.

Question 8

Mean: 2.01 Standard deviation: 2.02

This question required candidates to define genetic terms, answer questions on sickle-cell anaemia and to do a simple genetic cross. It was poorly done, twenty-eight per cent of the candidates scored zero marks.

Candidates were knowledgeable about the effects of sickle-cell anaemia on an individual, Part (c) (ii). They were also able to work out the genetic cross using a Punnett square (Part (d)). They lost marks however, in being unable to state the phenotypes of the offspring. Also, there was a misconception that albinism was sex-linked (used in the introduction of the question).

Candidates were not able to define genetic variation or environmental variation; they were also unable to give the meaning of DNA and to state the difference in shape between normal red blood cells and sickle red blood cells.

Recommendations 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 comes up in other topics. The candidates should be allowed to practise working out genetic crosses and encouraged to learn definitions of genetic terms.

Question 9

Mean: 5.12 Standard deviation: 1.94

This question tested candidates' knowledge of sexually transmitted infections. It was fairly well done.

Candidates answered questions on the effect of Herpes on babies fairly well, as well as the questions pertaining to limiting the spread of AIDS and use of antiviral drugs. Candidates had difficulty with the term 'causative agent', stating instead how the diseases were transmitted. The causative agent of Herpes is a virus; a bacterium causes Gonorrhoea.

Recommendation to teachers

Candidates should be encouraged to use scientific terms instead of slangs, slogans and advertisements, especially as it pertains to AIDS. Some candidates used the term 'condomize' and 'pinch, leave an inch and roll' instead of simply stating that condoms should be used during sexual intercourse. Students should be given the opportunity to answer different types of questions.

Question 10

Mean: 4.37 Standard deviation: 1.74

This question was only moderately done. It tested candidates' knowledge of pollution, eutrophication and disposal of sewage.

Candidates were able to list types of pollution and diseases associated with coming into contact with untreated sewage. However, most candidates were unable to explain the term 'eutrophication', or how detergents, sewage and agricultural activities lead to it.

Candidates were expected to say that *eutrophication is the massive growth of plants in water courses, which leads to a depletion in oxygen and hence death of aquatic organisms*. The phosphates in detergents, the nutrients released when bacteria decompose sewage, and the fertilizers from agricultural activities lead to this massive growth.

Recommendation to teachers

Some time should be spent teaching students the chemicals present in common substances such as detergents and fertilizers and their effects on the environment.

Section B comprised four structured essay questions, each worth 20 marks. Candidates were required to answer any two questions.

Question 11

Mean: 5.11 Standard deviation: 2.99

The question tested candidates' knowledge of chronic diseases, high blood pressure, diabetes mellitus and alcoholism. Candidates were able to name three chronic diseases other than diabetes mellitus and identify two non-drug forms of therapy used in the treatment of chronic diseases. For Part (b), candidates were unable to suggest why blood pressure increases as weight increases above normal and were not able to explain how high blood pressure may affect a person.

A good answer to Part (b) (i) could have been: *As weight increases fat is laid down on the walls of arteries and this reduces the diameter of the arteries. As blood flows through the arteries, the smaller diameter causes the blood pressure to increase.*

Candidates did not limit their answers about alcohol to its role as a depressant drug but instead included effects of alcohol on the entire body. As a depressant drug, alcohol slows down the passage of nerve impulses causing slow reaction times, poor muscle coordination and slurred speech, among other things.

Recommendations to teachers

Students should be encouraged to accurately learn about the effects and treatment of chronic diseases. Health-care personnel as well as persons suffering from diseases such as diabetes and hypertension could be invited to talk to students about chronic diseases.

Question 12

Mean: 8.18 Standard deviation: 3.73

Candidates' knowledge of sexual reproduction, prenatal care and care of the teeth were being assessed in this question. Performance was good. Candidates were able to list methods of preventing cavities and gum diseases but did not expand or explain them. Most candidates had a good knowledge about pregnancy with regard to diet and health. However, some candidates were not specific in their responses.

Most candidates were unable to give the meaning of the terms 'fertilization', 'sexual reproduction' and 'ovulation'. In many responses, candidates used ovary and ovum incorrectly. They also confused ovulation with menstruation or the period during which the female is able to become pregnant. A few candidates confused the term fertilizers (agricultural) with fertilization.

Recommendations to teachers

Students should be encouraged to learn definitions. Charts, diagrams and videos could be used to teach the menstrual cycle. Health-care personnel could be invited to discuss the reproductive system and how it functions.

Question 13

Mean: 9.42 Standard deviation: 4.04

Candidates' performance on this question was good. Their knowledge of the life cycle of the housefly and reasons for the outbreak of diseases like cholera and gastroenteritis after a hurricane were required. Candidates were also tested on ringworm and athlete's foot.

Most candidates were able to name the stages in the life cycle of the housefly and to describe athlete's foot, the control and treatment of ringworm.

Candidates were not able to identify the feeding and non-feeding stages of the housefly. The word 'pupil' was used instead of pupa. Most candidates were unable to describe the appearance of ringworm. Many of them simply described the shape. Many candidates also failed to recognize that cholera and gastroenteritis could be spread via water. Too many candidates wrote that ringworm is caused by tapeworms and round worms rather than by a fungus.

Recommendation to teachers

Teachers should discourage students from suggesting home remedies instead of scientifically proven treatments for an illness or condition.

Question 14

Mean: 6.76 Standard deviation: 4.44

This question was not well done. Candidates were tested on their knowledge of digestion, excretion and the role of the skin in temperature control and protection from pathogens.

Most candidates were able to define digestion, state the function of roughage and give an example of a good source of roughage. Many were also able to state why infections by pathogens will occur if the skin is damaged.

Candidates were not able to define excretion and egestion. They were expected to state that excretion was removal of **metabolic** waste rather than just waste. Some candidates confused 'egestion' with 'ingestion'. Though the question simply asked to state how the end products of digestion are used by the body, candidates described the entire process of digestion.

Candidates erroneously stated that blood vessels move closer to or away from the surface of the skin as opposed to vasodilation and vasoconstriction.

Recommendations to teachers

Animations and videos can be used to reinforce concepts. Teachers should stress the relationship between structure and function. Visual aids could be used to teach the skin and its role in temperature control.