033 BIOLOGY
CANDIDATES' ITEM RESPONSE ANALYSIS REPORT FOR THE CERTIFICATE OF SECONDARY EDUCATION EXAMINATION (CSEE) 2019

033 BIOLOGY
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FOREWORD

The National Examinations Council of Tanzania is delighted to issue this report on Candidates’ Item Response Analysis (CIRA) for Certificate of Secondary Education Examination (CSEE) in Biology subject which was conducted in November 2019.

The CSEE marks the end of four years of secondary education. It is a summative assessment which, among other things, assesses the knowledge and skills acquired by the candidates in secondary education.

The analysis presented in this report highlights factors that made some of the candidates to score high or low marks in each question. The factors which made some of the candidates fail to score high marks include: failure to understand the demand of the question, lack of or insufficient content knowledge, poor essay writing skills and poor command of English Language. It is expected that, this report will enable education administrators, school managers, teachers, students other education stakeholders and the members of the public in general to locate areas where the candidates have learning difficulties and make improvement. Moreover, the feedback will help in making decision on how to improve the secondary education for good performance in Biology examinations administered by the Council.

Finally, the Council would like to express its gratitude to the Examination Officers, Examiners and all who participated in the preparation of this report.

Dr. Charles E. Msonde
EXECUTIVE SECRETARY
1.0 INTRODUCTION

This report focuses on the performance of the candidates in Biology Certificate of Secondary Education Examination (CSEE) which was held in November 2019. The examination paper comprised questions which were intended to measure candidates’ competences on the content in the 2010 Biology syllabus.

The CSEE Biology paper was set in accordance with the NECTA format issued in 2019. The paper consisted of 15 questions in sections A, B and C. Section A consisted of two questions, which were multiple choices and matching items. Question one carried 10 marks and question two 5 marks. Section B comprised 10 short answer questions each carrying 6 marks. Section C consisted of three essay type questions where by question 13 carried 15 marks while other two questions carried 10 marks each. Candidates were instructed to answer all questions in sections A and B. In section C candidates were instructed to answer two questions where question 13 was compulsory.

Data show that a total of 431,910 candidates were registered for the examination. However, 423,887 sat for examination out of which 232,960 (55.26%) passed and 190,927 (45.74%) failed. This implies that, the general performance in this subject was average. This performance is lower by 5.63 percent when compared to that of 2018 where 217,531 (60.89%) candidates passed.

The quality of performance in each item can be rated by how much the candidate managed to score out of the given full marks in each question. Performance in a question was considered to be good, average or weak if the percentage of the candidates who scored 30 percent or more of the marks allocated in a question lies between 65 to 100, 30 to 64 and 0 to 29 respectively. In addition, green, yellow and red colours have been used in charts and appendices to indicate good, average and poor performance, respectively.

The subsequent section of the report analyses the performance of candidates in each question by describing the demand of the question and candidates’ responses. It also highlights misconceptions observed on candidates’ responses and spots some possible reasons for the observed misconceptions.
The samples of the candidates’ responses were inserted as extracts to illustrate good and poor responses. In addition, some charts and graphs were used to illustrate candidates’ performance in each question.

Generally, the report consists of five main sections which are: introduction, analysis of the candidates’ performance per question, analysis of candidate performance in each topic, conclusion and recommendations.

2.0 ANALYSIS OF THE CANDIDATES’ PERFORMANCE IN EACH QUESTION

The section analyses the performance of the candidates in each question and item in sections A, B, and C as follows:

2.1 SECTION A: Objective Questions

This section comprised question 1 and 2 which were multiple choice and matching items, respectively. The candidates were instructed to answer all questions.

2.1.1 Question 1: Multiple Choice Items

The question consisted of 10 multiple choice items. In these items, the candidates were instructed to choose the correct response from the given five alternatives and write its letter in the answer booklets provided. The items were constructed from 10 topics, namely; Introduction to Biology, Safety in Our Environment, Nutrition, Balance of Nature, Transport of Materials in Living Things, Regulation, Growth, Coordination, Genetics, and Evolution.

A total of 423,842 candidates attempted this question. The analysis shows that, 33.5 percent of the candidates scored from 0 to 2 marks out of the 10 marks allocated to this question. The candidates who scored from 3 to 6 were 57.6 percent while 8.9 percent scored from 7 to 10 marks. The summary of the candidates’ performance in this question is presented in Figure 1.
Figure 1: The summary of the candidates’ performance in question 1

Figure 1 shows that the general performance in this question was good since 66.5 percent of the candidates scored from 30 and above of the 10 marks allocated to this question. This indicates that the candidates had adequate knowledge of the tested topics. Those who scored low marks (0–2) failed to give correct responses as per requirements of the question. The analysis of candidates’ response in each item is presented hereunder.

Item (i) What is the aim of doing experiment when conducting a scientific investigation?

A  Identifying a problem  B  Finding a solution
C  Testing hypothesis  D  Gathering information
E  Recording results

The correct response for this item is alternative C, Testing hypothesis. The candidates who chose C, Testing hypothesis were familiar with the basic scientific processes in Biology. On the other hand, those who chose A, identifying a problem were not aware that this is the first stage in scientific investigation. Those who chose B, Finding a solution and D, Gathering information failed to understand that these are normal ways of solving problems. Likewise, those who selected E, Recording results failed to understand that recording results is a step just after experimentation.
Item (ii) Why is it advised to build an incinerator in every hospital and health center?

A. for collecting wastes  
B. for disposing gaseous waste  
C. for disposing liquid wastes  
D. for burning hazardous wastes  
E. for disposing plastic wastes

The correct response for this item is **D, for burning hazardous wastes**. The candidates who selected the correct response were familiar with the concept of waste disposal. However, those who selected **A, for collecting wastes** failed to understand that collection of wastes depends on its type i.e. solid, liquid or gaseous and how hazardous they are. Those who selected incorrect response **B, for disposing gaseous waste** and **C, for disposing liquid wastes**, failed to understand that incinerator is used for burning solid waste materials. Those who selected **E, for disposing plastic wastes** failed to realize that plastic wastes can be recycled.

Item (iii) Mrs. Juma’s child has protruding stomach and swollen lower limbs. What types of food should she give to her child to overcome the problem?

A. Starch  
B. Lipids  
C. Proteins  
D. Minerals  
E. Vitamins

The correct response for this item is alternative **C, Proteins**. The candidates who responded correctly were aware of the different types of nutritional deficiencies and disorders in human beings. On the other hand, those who selected **A, Starch** and **B, Lipids** failed to understand that their deficiency leads to weak body. Those who selected **D, Minerals** and **E, Vitamins** did not understand that mineral and vitamin deficiencies lead to specific deficiency diseases according to the type of nutrient which is lacking. For example, lack of iodine leads to Goitre while lack of vitamin C leads to scurvy.

Item (iv) In the food chain: Grass → Zebra → Lion. A lion is

A. a primary consumer  
B. a secondary consumer  
C. a producer  
D. a tertiary consumer  
E. a decomposer
The correct response for this item is \textit{B, a secondary consumer}. The candidates who responded correctly to this item had adequate knowledge of trophic levels in the food chain. On the contrary, those who selected \textit{A, a primary consumer} failed to understand that primary consumers are always herbivores which feed on green plants (producers). Those who selected \textit{C, a producer} failed to realize that producers are organisms that make their own food such as grasses. Those who selected \textit{D, a tertiary consumer} did not understand that these are organisms that feed on secondary consumers. Likewise, those who selected \textit{E, a decomposer} failed to realize that decomposers are organisms such as bacteria and fungi which break down the dead and decayed organic matter.

\textbf{Item (v)} Water from the roots of the flowering plants is transported up to the plant by different forces. Which of the following forces initiates and raises water to the least height?

\begin{itemize}
  \item [A] Root pressure
  \item [B] Transpiration pull
  \item [C] Cohesion forces
  \item [D] Adhesion forces
  \item [E] Capillarity
\end{itemize}

The correct response for this item is \textit{A, Root pressure}. The candidates who responded correctly had adequate knowledge on the mechanism for uptake of water and dissolved minerals in plants. On the contrary, those who chose \textit{B, Transpiration pull}, failed to understand that this is a force that draws water over a long distance from the roots to the leaf. Those who selected \textit{C, Cohesion forces} and \textit{D, Adhesion forces} did not understand that these are forces which support absorption of water through capillarity pull whereby cohesion makes water molecules to stick together and adhesion makes water molecules to adhere to the xylem vessels. Likewise, those who chose incorrect response \textit{E, Capillarity} did not understand that capillarity is the condition that cause water to rise in narrow tubes called xylem vessels.

\textbf{Item (vi)} A patient has been diagnosed with low level of blood sugar. Which hormone would you recommend to regulate the victim's sugar?

\begin{itemize}
  \item [A] Insulin
  \item [B] Glucagon
  \item [C] Antidiuretic
  \item [D] Aldosterone
  \item [E] Testosterone
\end{itemize}

The correct response for this item is \textit{B, glucagon}. A few candidates responded correctly to this item indicating possession of adequate knowledge on blood sugar regulation in mammals, specifically human being. They were aware that
when there is low sugar in the blood glucagon converts glycogen stored in the liver and other parts into sugar (glucose) in order to restore the level of blood sugar. Conversely, those who selected A, insulin failed to understand that the hormone converts excess blood sugar into the glycogen for storage. Those who selected C, antidiuretic failed to understand that this hormone regulates the amount of water in the body by controlling the reabsorption of water in the kidneys. Those who selected D, aldosterone failed to realize that aldosterone hormone regulates reabsorption of sodium chloride in the kidneys. Likewise, those who selected E, testosterone failed to realize that the hormone testosterone stimulates the production of gametes and development of secondary sexual characteristics in males.

Item (vii) Which one is the feature of aging in human beings?

- A Shorter reaction times
- B Strong bones
- C Strong muscles
- D Body increases in size
- E Wrinkling of the skin

The correct response for this item is E, Wrinkling of the skin. The candidates who correctly responded were aware of growth and developmental stages in human. On the other hand, those who selected A, Shorter reaction times failed to understand that as a person grows old the ability to handle emotions is high. Those who selected B, Strong bones and C, Strong muscles were not aware that aging in human beings weakens bones and muscles. In the same vein, those who selected D, Body increases in size failed to realize that body increase in size during childhood and adolescence stages but during aging the growth ceases.

Item (viii) What is the role of node of ranvier in a neurone?

- A To transmit the impulses away from the cell body
- B To insulate the axon and speed up transmission of impulses
- C To transmit nerve impulses from one nerve to another
- D To speed up transmission of nerve impulses
- E To transmit the nerve impulses toward the cell body

The correct response for this item is D, to speed up transmission of nerve impulses. The candidates who selected it had clear understanding of the structure of neurons. They were aware that, when impulse reaches at the nodes of ranvier, it jumps from one node to another hence, increases the speed of impulse within the neurone. Conversely, the candidates who selected A, to transmit the impulses away from the cell body failed to understand that this is
the role of axon. Those who selected B, *to insulate the axon and speed up transmission of impulses* did not understand that is the role of myelin sheath and node of ranvier respectively. Those who selected C, *to transmit nerve impulses from one nerve to another* did not realize that, this is the function of relay neurone. In the same way, those who selected E, *to transmit the nerve impulses toward the cell body* were not aware that, this is the function of dendrites.

**Item (ix) What is variation as applied to genetics?**

- A Differences among individuals of the related species
- B Differences among individuals of the same species.
- C Differences among individuals of different species
- D Differences among individuals of unrelated species
- E Differences among individuals of the expected species

The correct response for this item was **B**, *Differences among individuals of the same species*. The candidates who selected the correct response were knowledgeable on the concept of variation among organisms. Those who chose A, *Differences among individuals of the related species*; C, *Differences among individuals of different species*; D, *Differences among individuals of unrelated species* and E, *Differences among individuals of the expected species* failed to understand that, in genetic variations these are considered and studied only if they exist in individuals of the same species and not otherwise.

**Item (x) Which one is correct about Cosmozian theory of origin of life?**

- A Life was brought in this Earth from elsewhere.
- B Life arose according to physical and chemical laws.
- C Living organisms arose from non-living materials.
- D The Earth and all the organisms on it were created by God.
- E The planet Earth and all the organisms have always been there.

The correct response for this item is **A**, *Life was brought in this Earth from elsewhere*. The candidates who responded correctly to this question had adequate knowledge of the concepts of theories of origin of life. On the other hand, those who selected **B**, *life arose according to physical and chemical laws* failed to understand that this is the theory of chemical evolution. Those who selected **C**, *living organisms arose from non-living materials* were not aware that this is the theory of spontaneous generation. Those who selected **D**, *the Earth and all the organisms on it were created by God* failed to understand that, this is the theory of special creation.
Likewise, those who selected *E, the planet Earth and all the organisms have always been there* were not aware that this is the steady state theory.

### 2.1.2 Question 2: Movement

This question consisted of five matching items derived from the topic of Movement. The question required the candidates to match the phrases provided in **List A** with their corresponding responses in **List B** by writing the letters of the correct responses against the item number in the answer booklet provided. The items were:

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Axial component which protects the delicate internal organs such as lungs and the heart.</td>
<td>A Pivot</td>
</tr>
<tr>
<td>(ii) Axial component which protects the brain and provide area for attachment of the neck.</td>
<td>B Vertebral column</td>
</tr>
<tr>
<td>(iii) Appendicular component which provide large surface area for muscle attachment and a base for articulation with hind limbs.</td>
<td>C Lumbar</td>
</tr>
<tr>
<td>(iv) Axial component which protects the spinal cord.</td>
<td>D Pelvic girdle</td>
</tr>
<tr>
<td>(v) Appendicular component which provide large surface area for muscles attachment and a base for articulation with upper arm bones.</td>
<td>E Cervical</td>
</tr>
<tr>
<td></td>
<td>F Rib cage</td>
</tr>
<tr>
<td></td>
<td>G Skull</td>
</tr>
<tr>
<td></td>
<td>H Pectoral girdle</td>
</tr>
</tbody>
</table>

The analysis of candidates’ performance indicates that, out of 423,842 candidates who responded to this question, 44.2 percent scored from 0 to 1 out of 5 marks allocated to the question. The candidates who scored from 1.5 to 3 marks were 36.1 percent and 19.7 percent scored from 3.5 to 5 marks. Figure 2 summarizes the performance.
Figure 2: The summary of candidates’ performance in question 2

Figure 2 shows that, candidates’ performance in this question was average since 55.8 percent scored 1.5 to 5 marks out of the 5 marks allocated to it. This shows that, the candidates had adequate knowledge of the topic of Movement. Therefore, they managed to correctly match most of the items given. Extract 2.1 illustrates a response from one of the candidates who matched all the phrases correctly.

Extract 2.1: Candidate’s good response in question 2

In extract 2.1, the candidate matched all the items correctly. These responses signify that the candidate had adequate knowledge of the tested topic.

Those who scored lower marks (0–1) gave incorrect responses contrary to the requirements of the question. The analysis of the candidates’ responses to each item is as follows:

In item (i), candidates were required to select the response which matches the description of the axial component which protects the delicate internal organs such as lungs and the heart. The correct response is \(F\), \textit{Rib cage}. Most candidates matched it correctly showing that they had adequate
knowledge of the role of parts of axial skeleton specifically the rib cage. For a few who wrote E, cervical failed to understand that, this provides surface area for muscles attachment and a base for articulation with the neck.

In item (ii), candidates were required to select the response which matches the description of the axial component which protects the brain and provide area for attachment of the neck. The correct response is G, Skull. Most candidates selected C, Lumbar instead of G, Skull. These candidates failed to realize that lumbar provides attachment for muscles of the abdominal region while skull protects the brain.

In item (iii), the candidates were required to select a response which matches with a description of the appendicular component which provides large surface area for muscle attachment and a base for articulation with hind limbs structure. The correct response is D, Pelvic girdle. Most of the candidates got it right. However, some lacked the knowledge of the role of the parts of the appendicular skeleton and hence responded incorrectly.

In item (iv), candidates were required to select the response which matches the description of the axial component which protects the spinal cord. The correct response is B, Vertebral column. Most of the candidates responded correctly. However, some of the candidates wrote G, Skull instead of the vertebral column. These candidates failed to understand that skull protects the brain while vertebral column protects the spinal cord.

In item (v), candidates were required to select the response which matches the description of the appendicular component which provides large surface area for muscles attachment and a base for articulation with upper arm bones. The correct response is H, Pectoral girdle. Most candidates matched it correctly showing that they had adequate knowledge of the role of parts of axial skeleton specifically pectoral girdle. A few of the candidates wrote A, Pivot instead of H, Pectoral girdle. They failed to understand that pivot is the type of joint found between the first (atlas) and second (axis) vertebrae in the neck region. Extract 2.2 is a sample of poor response from the candidate who failed to match all the items correctly.

**Extract 2.2: Candidate’s poor response in question 2**
In extract 2.2 the candidate responded incorrectly to all the items of the question. These responses signify that the candidate had insufficient knowledge of the tested topic.

2.2 SECTION B: Short Answer Questions

This section had 10 short answer questions. The analysis of each question is as follows:

2.2.1 Question 3: Introduction to Biology

In this question the candidates were instructed to draw the apparatus used for: (a) putting specimens for close observation, (b) grinding or crushing substances in the laboratory, (c) adding liquids during an experiment drop by drop and (d) scooping powder or crystalline substances.

A total of 423,841 candidates attempted this question. The analysis of data on performance shows that 54.6 percent of the candidates scored from 0 to 1.5 marks, out of 6 marks allocated to this question. The candidates who scored from 2 to 3.5 were 32.2 percent whereas 13.2 percent scored from 4 to 6 marks as presented in Figure 3.

![Figure 3: Shows the candidates’ performance in question 3](image)

Based on the analysis in Figure 3, the general performance in this question was average because 45.4 percent of the candidates scored 30 percent and
above of the 6 marks allotted to this question. This performance was affected by candidates’ inability to correlate laboratory apparatuses with their roles. In addition, some candidates had poor drawing skills.

Despite the average performance, 13.2 percent of the candidates performed well in this question. They correctly identified and drew the required apparatuses. This indicates that, the candidates had adequate knowledge on the topic of Introduction to Biology. Extract 3.1 demonstrates a sample of the candidates’ good response in this question.

**Extract 3.1: Candidate’s good response in question 3**

Extract 3.1 is a sample of the candidate’s response who correctly drew the Biology laboratory apparatus according to the demand of the question.
However, 54.6 percent of the candidates obtained low marks (0-1.5). The candidates who scored low marks drew incorrect apparatuses in all or most parts of the question. For example, in part (a) one candidate drew a microscope while another one drew hand lens instead of petri dish. In part (b) one candidate drew petri dish. In part (c) one candidate drew burette and in part (d) one candidate drew watch glass. These responses indicate that candidates had inadequate knowledge on the concept of laboratory equipment and apparatus. Extract 3.2 is a sample of one candidate’s poor response.

**Extract 3.2:** A sample of the candidate’s poor response in question 3

Extract 3.2 shows a response from the candidate who confused the diagram of the apparatus. In part (a) the candidate drew mortar and pestle instead of the petri dish or watch glass. In part (b), he/she drew dropper instead of
mortar and pestle, in part (c) he/she drew spatula instead of dropper. Also, in part (d) the candidate drew the watch glass instead of spatula.

### 2.2.2 Question 4: Safety in Our Environment

In this question the candidates were instructed to briefly explain three problems which are likely to happen to the communities which pollute their water source by disposing in the wastes.

Data indicate that out of 423,842 candidates who responded to this question, 37.8 percent scored from 0 to 1.5 marks, out of which, 29 percent scored a 0 mark. The candidates who scored from 2 to 3.5 marks were 30.8 percent whereas 31.4 percent scored from 4 to 6 marks. The performance is presented in Figure 4.

![Figure 4: The candidates’ performance in question 4](image)

Figure 4 shows that the general performance in this question was average since 62.2 percent of the candidates scored 30 and above of 6 marks allocated to this question. The candidates with average score managed to explain not more than two problems which are likely to occur due to disposal of wastes to the lake which supply water to the communities. This indicates that the candidates had partial knowledge of effects of poor waste disposal.

Despite the average performance, 31.4 percent of the candidates performed well in this question. These candidates correctly explained the problems which
are likely to happen to the community which pollutes its water source. This shows that the candidates had adequate knowledge on the concept of wastes and wastes disposal. Extract 4.1 is a sample of one candidate’s good responses.

**Extract 4.1:** Candidate’s good response in question 4

Extract 4.1 is response of a candidate who correctly explained problems that are likely to happen to the communities where people dispose waste around the lake which supplies water to the communities.

However, 37.8 percent of the candidates who attempted this question obtained low marks (0 – 1.5). Some of these candidates gave incorrect responses such as *it leads to soil infertility, it can lead to shortage of pure water, if wastes are disposed in lakes people should not use that water.* These responses indicate lack of knowledge of the tested concepts. Others did not understand the demand of the question as they wrote the importance of proper waste disposal such as *it prevents spread of diseases, it provides a pleasing atmosphere, it prevents accidents and injuries.* Extract 4.2 is a sample of one of the candidates’ poor response.
Extract 4.2: Candidate’s poor response in question 4

In extract 4.2 the candidate wrote the principles of waste disposal such as reusing, recycling and reducing instead of explaining the problems that are likely to happen to the surrounding communities in the area where there is a poor waste disposal. He/she also had poor command of the English Language.

2.2.3 Question 5: Co-ordination

The candidates were instructed to differentiate between nervous system and endocrine system by giving three points.

Data analysis shows that 423,841 candidates attempted this question, where 88.2 percent scored from 0 to 1.5 marks, 6.9 percent scored from 2 to 3.5 marks and 4.9 percent scored from 4 to 6 marks. Figure 5 summarizes the performance.
Figure 5: Candidates’ performance in question 5

Figure 5 indicates that the candidates’ performance in this question was weak since 88.2 percent scored 0 to 1.5 out of 6 marks allocated to this question.

Most of the candidates failed to explain the differences between nervous and endocrine system. For example, one of the candidates wrote: *Nervous system is used to put the information to the system of the body for stimulus hormone while endocrine system it is used to put the information on some parts of the body about glands and others, Nervous system produce hormone in the body while endocrine system it produce glands into the body.* All these responses indicate lack of knowledge of the tested concepts. Other candidates interchanged the difference due to inadequate knowledge of the topic of Coordination. Extract 5.1 shows a sample of the candidate’s poor response.
Extract 5.1: Candidate’s poor response in question 5

Extract 5.1 is a poor response from the candidate who wrote *Nervous system produces hormone in the body while endocrine system produces glands in the body.*

Despite the poor performance in this question, 4.9 percent of the candidates obtained good marks. These candidates correctly explained the differences between nervous system and endocrine system. This indicates that the candidates had adequate knowledge of the topic of Coordination. Extract 5.2 shows a sample of the candidate’s good response.

Extract 5.2: candidate’s good response in question 5
In extract 5.2 the candidate correctly wrote the differences between nervous system and endocrine system.

### 2.2.4 Question 6: Nutrition

In this question the candidates were instructed to: (a) identify the digestive disorder faced by Jairus who complains of having burning sensation around the chest region and (b) give five measures he should take to treat the disorder.

Data analysis shows that out of 423,842 candidates who attempted this question, 78.6 percent scored from 0 to 1.5 marks out of 6 marks allocated to this question. The candidates who scored from 2 to 3.5 marks were 15.7 percent whereas 5.7 percent scored from 4 to 6 marks. Figure 6 summarizes the performance.

![Figure 6: Candidates performance in question 6](image)

Figure 6 indicates that, the candidates’ performance in question 6 was weak since 78.6 percent of the candidates scored low (0-1.5) marks. In part (a) most of the candidates wrote incorrect responses such as *tuberculosis, constipation* and *ulcers*. Other candidates wrote hormonal disorders such as, *goiter* and *diabetes*. All these responses indicate that the candidates had insufficient knowledge of the tested concepts.

Likewise, in part (b), some candidates failed to give five measures that should be taken to treat the disorder. Example, some candidates wrote, *vaccination, medical treatment, open the window and door at many people, eat balanced diet* and *drink hot water*. These responses show that the
candidates lacked content knowledge about symptoms of diseases and disorders of human digestive system. Extract 6.1 is a sample of one of the candidates’ poor response.

<table>
<thead>
<tr>
<th>The digestive disorder is helping is marasmus</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) To provision education in order to reduce the disorder</td>
</tr>
<tr>
<td>To improve transport and communication in order to sending those who suffering about the disorder</td>
</tr>
<tr>
<td>To provision of social services for example health services, hospital to a certain area.</td>
</tr>
<tr>
<td>To send to the hospital in order to treat disorder</td>
</tr>
<tr>
<td>To drink medicine which related to the burning sensation around the chest region</td>
</tr>
</tbody>
</table>

**Extract 6.1:** Candidate’s poor response in question 6

Extract 6.1 is a response from the candidate who in part (a) wrote marasmus as a digestive disorder associated with burning sensation around the chest region instead of heartburn. He/she also wrote incorrect responses in part (b).

Despite the weak performance in this question, 5.7 percent of the candidates obtained high marks (4 to 6). These candidates correctly identified the disorder in part (a) and wrote correct measures that should be taken to treat the disorder. This indicates that the candidates had adequate knowledge about the topic of Nutrition. Extract 6.2 shows a sample of one of the candidates’ good responses.
Extract 6.2: Candidate’s good response in question 6

Extract 6.2 is a response from a candidate who identified the correct disorder in part (a). Also he/she correctly wrote five measures to treat heartburn.

2.2.5 Question 7: Reproduction

The candidates were provided with Figure 1 which represents the external structure of a hibiscus flower as shown below:

![Figure 1](image)

The candidates were instructed to:

(a) name the parts labeled A, B, C, D, E and F.
(b) Identify the functions of the parts labeled B, D and E.
A total of 423,842 candidates attempted this question. Data analysis shows that, 73.9 percent scored from 0 to 1.5 marks out of the 6 marks allocate to this question. The candidates who scored from 2 to 3.5 marks were 18.1 whereas 8 percent scored from 4 to 6 marks. The data are illustrated in Figure 7.

![Scores](chart.png)

**Figure 7: The candidates’ performance in question 7**

Figure 7 shows that the general performance of the candidate in this question was weak since the majority of the candidates (73.9%) scored low marks (0 – 1.5). The candidates who scored low marks incorrectly named the parts A, B, C, D, E and F as parts of the cell such as, A - cell membrane, B-Nucleus, C-chloroplast, D - Vacuole, E - mitochondria, F - cytoplasm. Others mixed up the labels by writing A - Anther instead of stigma, B - stigma instead of Anther, C - Style instead of stamen tube, D - Sepal instead of petals, E - petals instead of sepals and F - Anther instead of flower stalk.

In part (b), some candidates failed to explain the functions of the parts labeled B, D and E. For example, some candidates wrote B - it is used to attract insect to follow the flower, D - It is used to make flower open for the ovule to come out, E - Used to make the stalk flower to not to be the end. All these poor responses were the results of candidates’ inadequate knowledge of the structure of the flower. Extract 7.1 shows the sample of the candidate’s poor response in this question.
In extract 7.1 the candidate wrote incorrect responses in parts (a) and (b). For example, in part (b) he/she wrote the function of part D, Petal is *site for photosynthesis*.

Despite the weak performance in this question, 8 percent of the candidates obtained high marks. These candidates managed to name the parts of the flower accordingly and the functions of the labeled parts. This shows that the candidates had adequate knowledge of the structure and function of the flower parts. Extract 7.2 shows the sample of the candidate’s good response.
Extract 7.2: Candidate’s good response in question 7

Extract 7.2 shows a sample of response from a candidate who correctly named the parts labeled A, B, C, D, E and F in part (a). He/she also correctly wrote the functions of the parts labeled B, D, and E in part (b).

2.2.6 Question 8: Transport of Materials in Living Things

The candidates were instructed to elaborate briefly three impacts of ringing in trees/plant.

A total of 423,841 candidates attempted this question. Data analysis reveals that, 95.2 percent of the candidates scored from 0 to 1.5 marks out of the 6 marks allocated to this question. The candidates who scored from 2 to 3.5 marks were 4 percent whereas 0.8 percent scored from 4 to 6 marks. The performance is summarized in Figure 8.
Figure 8: Candidates performance in question 8

Figure 8 indicates that the candidates’ performance in this question was weak since 95.2 percent scored from 0 to 2.5 out of 6 marks allocated to this question. Most of the candidates wrote incorrect elaboration of the impact of ringing in trees such as: there will not be transportation of water in the plant, it hinders transportation of minerals from various parts of the plants, it decelerates the production of flowers in the plant. Others wrote seed coat will not be formed, the plant will not develop pericarp, and plant will not develop flowers. These candidates failed to recognize that, ringing destroys phloem tissue, thus impairing transport of manufactured food substance from the leaves to the roots. Therefore, after a certain period of time the food reserves in the plant parts will be exhausted and the plant die off. Extract 8.1 is the sample of response from a candidate who wrote incorrect responses.
Extract 8.1: Candidate’s poor response in question 8

Extract 8.1 is a sample of a response from a candidate who focused his/her responses toward impairing plant stability, protection and uptake of water instead of transport of food.

Despite the poor performance in this question, 0.8 percent of the candidates performed well. These candidates correctly elaborated the impact of ringing on the stem of hibiscus plant. Extract 8.2 shows the sample of the candidate’s good response.
Extract 8.2: A sample of good response from one of the candidate in question 8

Extract 8.2 is a response from the candidate who was aware that ringing destroys the phloem tissue thus; he/she correctly elaborated the impact of ringing in plant.

2.2.7 Question 9: Gaseous Exchange and Respiration

The candidates were instructed to explain in four points how respiratory surfaces are adapted to their functions.

Data analysis indicates that, out of 423,842 candidates who responded to this question, 93 percent scored from 0 to 1.5 out of 6 marks allocated to this question. The candidates who scored from 2 to 3.5 marks were 3.4 percent whereas 3.6 percent scored from 4 to 6 marks as shown in Figure 9.
The analysis indicates that the candidates’ performance in this question was weak since 88.1 percent scored from 0 to 1.5 out of 6 marks. Most of the candidates explained the factors affecting the rate of respiration instead of how the respiratory surfaces are adapted to their role. For instance, one candidate wrote temperature, age, size and health status. Another candidate wrote the adaptation of the heart to its role such as: has cardiac muscles which contracts and relax continuously without being fatigued, has muscular walls which contract to pump blood, and has coronary artery which supplies heart with nutrients. Others outlined the features of respiratory surfaces without explaining how they are adapted to their role. These candidates failed to understand that the term adaptation means the structural development which enables the structure to perform its function. Responses like this imply that the candidates did not understand the demand of the question. Extract 9.1 shows a sample of a candidate’s poor response.
Extract 9.1: Candidate’s poor response in question 9

Extract 9.1 is a response from a candidate who wrote features of respiratory surface such as *hair, rib cage, intercostal muscles* instead of explaining the adaptation of respiratory surfaces.

Despite the weak performance in this question by the majority, 3.6 percent of the candidates obtained good marks. These candidates correctly explained how the respiratory surfaces are adapted to their role. This implies that the candidates had adequate knowledge of the gaseous exchange in mammals. Extract 9.2 shows a sample of the candidate’s good response.
Extract 9.2: Candidate’s good response in question 9

Extract 9.2 is a good response of a candidate who correctly explained how respiratory surfaces are adapted to their role.

2.2.8 Question 10: Cell Structure and Organization

The question consisted of two parts. In part (a), the candidates were instructed to give two differences between cell membrane and cell wall. In part (b), they were instructed to give reason why cell differentiation is important to living organisms.

Data analysis indicates that out of 423,842 candidates who performed this question, 89.7 percent scored from 0 to 1.5 out of 6 marks allocated to this question. The candidates who scored from 2 to 3.5 marks were 8.7 percent whereas 1.6 percent scored from 4 to 6 marks as presented in Figure 10.
Figure 10: Distribution of the candidates’ performance in question 10

The trend of performance indicated in Figure 10 show that majority of the candidates (89.7%) obtained low marks. Most of them failed give two differences between cell membrane and cell wall. For example, in part (a) one candidate wrote cell membrane is used in storing of materials while cell wall gives a shape structure in animal, cell membrane is used in both animals and plant for storage while cell wall is the different because it is only found in animals. Another candidate regarded cell membrane as animal cell and cell wall as plant cell hence wrote: cell membrane has temporary vacuole while cell wall has permanent vacuole; cell membrane has no chloroplast while cell wall has chloroplast.

In part (b), most of the candidates gave incorrect reasons why cell differentiation is important to living organisms. For example some of them wrote cell differentiation helps in differentiating of the living organism, cell differentiation is a basic unity of human life, cell differentiation is important in supporting life of living thing. Others wrote the function of nucleus such as controlling all the activities of the cell instead of the importance of cell differentiation. Extract 10.1 is a sample of candidates’ poor response.
Extract 10.1: An example of candidate’s poor response in question 10

Extract 10.1 is a candidate’s response which shows incorrect differences between cell membrane and cell wall in part (a). Also in part (b) the candidate incorrectly explained the importance of cell differentiation.

Despite the weak performance, 1.6 percent of the candidates performed well. They correctly gave two differences between cell membrane and cell wall in part (a). They also gave correct reason why cell differentiation is important to living organisms. These responses imply that, the candidates had adequate knowledge of the topic of Cell structure and Organization. Extract 10.2 shows a sample of a candidate’s good response.
Extract 10.2: An example of candidate’s good response in question 10

Extract 10.2 is a sample response from the candidate who gave correct differences between cell membrane and cell wall. In part (b), he/she gave correct reasons why cell differentiation is important to living organisms.

2.2.9 Question 11: Excretion

In this question the candidates were instructed to suggest three possible causes and three control measures of kidney stones.

A total of 423,842 candidates attempted this question. Data analysis shows that, 79.2 percent of the candidates scored from 0 to 1.5 out of 6 marks allocated to this question. The candidates who scored from 2 to 3.5 marks were 15.3 whereas 5.5 percent of the candidates scored from 4 to 6 marks. The performance is presented in Figure 11.
Figure 11 shows that the general performance in this question was weak since 79.2 percent of the candidates scored low marks. Most of the candidates wrote incorrect causes and control measures of kidney stones. Examples of incorrect responses given on the causes are; taking stones into the body through mouth, staying for long time without going toilets. Another candidate wrote age since it faces more elder people, sexual intercourse with affected person, over production of reproductive organs. Another candidate wrote presence of narrow ureter in the kidney, failure of the kidneys to function, eating foods which contains sand particle, indigestion of food instead of the causes of kidney stones. Similarly on the control measures of kidney stones some candidates wrote to eat enough food substances, washing foods with clean water, visiting toilets frequently so as to reduce the content of stones in the body. Another candidate wrote using medicine to avoid kidney stone before they develop, do not eat food which are not well kept, do not stay with urine so long, do not drink water from sea, ocean ,pond and dam. These responses imply that candidates had insufficient knowledge of the topic of Excretion. Extract 11.1 illustrates one of the candidates’ poor responses.
Extract 11.1: An example of candidate’s poor response in question 11

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1</td>
<td>Causes of kidney stone</td>
</tr>
<tr>
<td>11.2</td>
<td>Stress</td>
</tr>
<tr>
<td>11.3</td>
<td>Lack of body physical exercise</td>
</tr>
<tr>
<td>11.4</td>
<td>Failure of hormone which are responsible for kidney absorption</td>
</tr>
<tr>
<td>11.5</td>
<td>Failure of the kidney to function</td>
</tr>
<tr>
<td>11.6</td>
<td>Measures of control of kidney stone</td>
</tr>
<tr>
<td>11.7</td>
<td>Should engage in physical exercise</td>
</tr>
<tr>
<td>11.8</td>
<td>Should avoid stress</td>
</tr>
<tr>
<td>11.9</td>
<td>Stating treatment early after being testing you have</td>
</tr>
</tbody>
</table>

Extract 11.1 is a response from one of the candidates who wrote incorrect causes of kidney stones. He/she also wrote the principle of maintaining good health instead of measures to control kidney stones.

Despite the weak performance, 5.5 percent of the candidates performed well. They correctly suggested three possible causes and three control measures of kidney stones. This shows that the candidates had adequate knowledge of the complications and disorders of the excretory system. Extract 11.2 shows a sample of one student’s good response.
Extract 11.2: Candidate’s good response in question 11

Extract 11.2 is a response from one of the candidates who correctly wrote three causes and control measures of kidney stones.

2.2.10 Question 12: Regulation

The candidates were instructed to briefly explain three ways that help reptiles to survive in different weather conditions.

Data reveal that out of 423,842 candidates who attempted this question, 93.9 percent scored from 0 to 1 out of 6 marks allocated to this question. The candidates who scored from 2 to 3 were 3.5 percent whereas 2.6 percent scored from 4 to 6. The candidates’ performance is presented in Figure 12.
The analysis indicates that the candidates’ performance in this question was weak since 93.9 percent scored from 0 to 1 out of 6 marks allotted to this question. Most of the candidate who gave incorrect responses in explaining ways that helps reptiles to survive in different weather conditions. Some wrote the mechanisms of temperature regulation in mammals instead of the ways that help reptiles to survive in cold weather conditions such as: 

*Increased metabolic rate- during cold weather conditions the rate of metabolism increases which leads to production of heat,*

*Vasoconstriction of blood vessels- During cold the blood vessels at the skin surface reduces blood flow in the skin thereby reducing heat loss by radiation.*

*Sweating- as sweating occurs it draws heat from the body which has a cools the body.*

These candidates failed to understand that reptiles, like all poikilotherms, do not have mechanisms for temperature regulation rather they have behavioural means of regulating their body temperature. Some of the candidates gave points which were not accompanied with explanation on the ways in which reptiles survive in different weather conditions. Extract 12.1 shows a candidate’s poor response in this question.
**Extract 12.1:** An example of a candidate’s poor response in question 12

Extract 12.1 is a response from a candidate who incorrectly wrote *has hard skin, cold blooded and ability of doing gaseous exchange* instead of explaining three ways that help reptiles to survive in different weather conditions.

Despite the weak performance in this question, 2.6 percent of the candidates obtained high marks. These candidates correctly explained three ways that help reptiles to survive in different weather conditions. This indicates that these few candidates had adequate knowledge about temperature regulation in animals. Extract 12.2 shows a sample of the candidate’s good response in this question.
Extract 12.2: Candidates’ good response in question 12

Extract 12.2 shows a response from one of the candidates who correctly explained three ways that help reptiles to survive in different weather conditions.

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. A</td>
<td>The ways which help reptiles to survive in different weather conditions involves:</td>
</tr>
<tr>
<td>12. B</td>
<td>- Hibernation. This is a process whereby some reptiles go into a deep sleep during the cold weather conditions. Reptiles do hibernate and reduce their metabolic activities so as to survive during the cold weather conditions.</td>
</tr>
<tr>
<td>12. C</td>
<td>- Activiation. This is the process whereby some reptiles go into a deep sleep in the burrows during the hot weather conditions. The reptiles activate so as to escape from very hot conditions which lead death of a reptile.</td>
</tr>
<tr>
<td>12. D</td>
<td>- Basking in the sun. In case that the temperature level decreases in the environment the reptiles move from the burrows and expose themselves to the directly sun so as to increase their temperature for metabolic activities.</td>
</tr>
</tbody>
</table>

2.3 SECTION C: Essay Questions

This section had three essay type questions. Question 13 carried 15 marks while each of the other two questions carried 10 marks. Candidates were required to answer two questions from this section including question 13.
2.3.1 Question 13: Health and Immunity

In this question the candidates were instructed to explain how they will educate members of Fema Club on the symptoms (five points) and transmission (four points) of HIV/AIDS.

Data analysis shows that, 423,839 (99.9%) candidates attempted this question of which 51.3 percent scored from 0 to 4 marks, 24.5 percent scored from 4.5 to 9 marks and 24.2 percent scored from 10 to 15 marks. Figure 13 summarizes the’ performance.

**Figure 13: Distribution of the candidates’ performance in question 13**

Figure 13 shows that the candidates’ performance was average since 48.7 percent scored 30 percent or above of the allocated 15 marks. Despite the average performance, 24.2 percent of the candidates performed well in this question. The candidates who performed well correctly explained five symptoms and four ways of transmitting the diseases. This reveals that, candidates had adequate knowledge on the concept of Human Immune Deficiency Virus (HIV)/Acquired Immune Deficiency Syndrome (AIDS), Sexually Transmitted Infections (STDs) and Sexually Transmitted Diseases (STDs). They organized their responses in essays having introduction, main body and the conclusion. They also showed mastery of English through good writing skills. Extract 13.1 is a sample of good response from one of the candidates.
HIV/AIDS is a pandemic disease that only affects humans. The disease AIDS is caused by a virus called Human immuno-deficiency virus (HIV). These viruses usually attack the helper T-cells, thus lowering body defense systems or body immunity. The following are the symptoms of a person suffering from HIV/AIDS:

- Loss of appetite; this is a situation where the victim does not feel any food appetizing. And if the victim does not eat food, then his/her body would have no energy causing further deterioration of body immunity.
- Prolonged coughing; also, a victim of HIV/AIDS is likely to be attacked by insignificant diseases that can be vital such as cough and may be accompanied with blood sputum.
- Severe diarrhoea; this is the passing of watery stool or feces. This is due to the digestive system, specifically the colon being affected and unable to absorb water. This may lead to dehydration of the body.
- Loss of weight; the victim of HIV/AIDS usually loses weight up to 5 kg in a short time. This is accompanied by general body weakness.
- Severe headache; this is the involuntary contraction of muscles around the head region. This may be influenced by factors like dehydration, rise in body temperature and insufficient food.
Extract 13.1 is a sample of response of a candidate who correctly explained five symptoms and four ways of transmitting HIV/AIDS. He/She also had good command of the English Language and good essay writing skills.

However, 51.3 percent of the candidates scored low marks (0 – 4). Most of the candidates wrote incorrect introduction such as: **HIV/AIDS is disease caused by bacteria, it is a non communicable disease, It is caused by fungi, HIV/AIDS refers to the diseases that are transmitted by virus.**

In the main body, some of the candidates outlined few points on the symptoms but did not explain them thus lead to loss of marks. Others
outlined the correct points but gave incorrect explanation. For example, one candidate wrote symptoms of malaria instead of symptoms of HIV/AIDS such as \textit{pain in joints, loss of appetite, chills and dizziness}. Likewise, on the ways of transmitting the disease one wrote incorrect responses such as \textit{sharing of underwear, sharing toilet with an infected person, peer pressure, lack of education, sharing of spoon and clothes}. Some of the candidates did not conclude their essay while others gave incorrect conclusion. These responses imply that the candidates lacked knowledge on the HIV/AIDS. Extract 13.2 shows a sample of candidate’s poor response in this question.

<table>
<thead>
<tr>
<th>Extract 13.2: Candidate’ poor response in question 13</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIV/AIDS</strong>: The diseases which are caused by the virus.</td>
</tr>
</tbody>
</table>
| *The following are the causes of HIV/AIDS which are:*
| 1. Sexual intercourse for people of HIV/AIDS |
| 2. Sharing for people of HIV/AIDS |
| 3. Sharing of blood |
| 4. Sharing the tissue |
| *The following are the symptoms of HIV/AIDS:*
| 1. Poverty |
| 2. Aids |
| 3. Prostitution in the people |
| 4. Separation of family member |
| *The following are the transmission of HIV/AIDS which are:*
| 1. Using the condom for the sexual intercourse |
| 2. Avoiding the good blood in the hospital |
| 3. Avoiding the people of not HIV/AIDS |
| 4. Do not sharing the used blade |
| 5. Avoiding the good blood |

Extract 13.2 is a sample of response of a candidate who wrote \textit{poverty, damage, prostitution in the people} and \textit{separation of family members} as symptoms of HIV/AIDS. The candidate also wrote incorrect ways of transmission of HIV/AIDS.

\textbf{2.3.2 Question 14: Classification of Living Things}

In this question the candidates were instructed to explain four ways in which fungi are beneficial to human being.
The analysis shows that 236,027 (55.7%) candidates attempted this question. Data indicate that 37.3 percent of the candidates scored from 0 to 2 marks, 31 percent scored from 3 to 6 marks whereas 31.7 percent scored from 7 to 10 marks. Figure 14 summarizes the candidates’ performance in this question.

![Bar Chart](chart.png)

**Figure 14:** The candidates’ performance in question 14

Figure 14 shows that the candidate’s performance in this question was average since 62.7 percent scored 30 percent or above of the 10 marks allocated to this question.

Most of the candidates who scored from 0 to 2 marks gave an incorrect introductory part and outlined one or two correct benefits of fungi. In addition to that, some candidates did not state the conclusion, which led to loss of marks.

The candidates with average performance gave a correct introductory part and explained two to three benefits of fungi, but their explanations were not in details as they lacked clarification in some facts which led to loss of some marks. In addition to that, some candidates stated incorrect conclusion.

Despite the average performance, 31.7 percent of the candidates performed well in this question and gave correct responses. They correctly explained four ways in which fungi are beneficial to human beings in an organized way: Introduction, Main body and Conclusion. This indicates that the candidates had
adequate knowledge of the topic of Classification of Living Things specifically Kingdom Fungi. Extracts 14.1 illustrates a sample of candidate’s good response.

14 Fungi are the organisms which are
kurd in the kind kingdom fungi and their distinctive
feature is the possession of hyphae and their body made
of chin materials. Fungi are among organisms which
are very useful to human being, therefore the following
are the ways in which fungi are beneficial to human being

Some of the fungi can be used
as a source of food. Food is an important thing in
life of a human being in the process of making him
survive, therefore as some fungi can be source of food
hence they will be as very important as other source of
food that provide nutrients to the human being to keep
him alive. Hence fungi as the source of food to human
being its the way to make it beneficial to human being.
Example of Fungi that can be source of food are some
mushrooms.

Some of the fungi can be used
in brewing industries to ferment fruits. In the manufacture
of alcohol fruits such as grapes which are used in making
alcohol are supposed to be fermented in order for the alcohol
to be made, so through the use of fungi a human being
has been able to manufacture alcohol to satisfy his need.
Hence fungi as a source of manufacture of alcohol in
industries its the way to make it beneficial to human being.

They can be used used in baking

to raise the doughs. In baking processes like bread baking
Extract 14.1: An example of a candidate’s good response in question 14

Extract 14.1 is a sample of the good response from the candidate who correctly explained four ways in which fungi are beneficial to human beings. The response is well organized into introductory part, main body and conclusion.

However, 37.3 percent of the candidates who attempted this question obtained low (0 – 2) marks. Most of them either gave one correct point or none in explaining the benefits of fungi to human being. For the candidates who scored zero mark, most of them did not understand the demand of the question. For example, some candidates wrote characteristics of fungi such as: *fungi are microorganisms which cannot manufacture their own food, fungi have root like structure called rhizoids*. Others wrote the benefits of bacteria such as *bacteria neutralize harmful substance to the environment, bacteria converts nitrogen to nitrates in the soil, some bacteria are used to make medicine for treating bacterial infection*. Others explained the characteristics of fungi such as *fungi are saprophytic organisms which have cell wall made up of chitin fungi are saprophytic organisms means feed on dead and decaying organic matter, fungi are eukaryotic have nucleus bound organelle*. For the candidates who scored 2 marks, some wrote only two responses but did not explain. This implies that the candidates had inadequate knowledge of the topic of Classification of
Living Things specifically Kingdom Fungi. Extract 14.2 shows the sample of candidate’s poor response.

| 14 | Fungi is a organism it used for preserving and preparing food for eating for example bread. Some people of a society believe that all fungi are harmful organisms because there is no education about fungi. Fungi it has many beneficial to human being. The following are few beneficial or important of fungi. There are:  
Fungi used for icing; For example collect your equipment and mix of water, sugar and fruit it breeding then put on your equipment and putting in the refrigerator.  
Fungi are habitats for other organisms; Some organisms that live in the bread after preparing it support of not destroy for example; soda and bread.  
Fungi used to preserve food for long time; It is true that fungi preserve food for long time for example; wheat, beans and cassava.  
It is source of prepare shape. It prepare shape for many things for example in breads and bread making.  
Therefore fungi is important for all people and all users of food because it is to support the life of all a living organisms. Also, Workers from the government should be educate the society about important of fungi. |

**Extract 14.2:** A sample of candidate’s poor response in question 14

In extract 14.2 the candidate wrote incorrect responses on the benefits of fungi to human being such as *fungi are used to preserve food.*
2.3.3 Question 15: Genetics

The candidates were instructed to explain why the study of genetics is important in our daily life.

The question was attempted by 187,752 (44.3%) candidates. Data show that 77.2 percent of the candidates scored from 0 to 2 marks, 16.4 percent scored from 3 to 6 marks whereas 6.4 percent scored from 7 to 10 marks out of 10 marks allocated to this question. Figure 15 summarizes the performance of candidates in this question.

![Scores](image)

**Figure 15: Shows the candidates performance in question 15**

Figure 15 shows that the performance in this question was weak since 77.2 percent scored low marks (0 – 2) out of 10 marks allocated to this question. Most of the candidates who attempted this question failed to explain the importance of genetics in our daily life. In the introduction they were required to define the term genetics but most of them gave incorrect responses. Some of the incorrect responses observed in the candidates scripts in the introduction include; *Genetics is the study of nucleic acids*, *Genetics is the study of physical appearance of organism*, *Genetics is the study of chromosomes*. In the main body the candidates also wrote incorrect points such as, *it help to improve the knowledge from parents to children, it help to improve nationality the behavior from one nation to another*. Another candidate wrote: *it reduces street children, it promotes accountability to the parents, It help to know the number of offspring*. In addition another candidate wrote *it is important in knowing genetic*
generation, it is important in changing of genetic constitution of the organism. All these responses imply that the candidates had inadequate knowledge on the concept of application of genetics. Extract 15.1 is sample of a response from one of the candidates who wrote incorrect responses.

<table>
<thead>
<tr>
<th>15</th>
<th>Genetic is no benefit of variation from organism.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The following of the study of genetic important in our daily life.</td>
</tr>
<tr>
<td></td>
<td>It help to understand the characteristic of organism.</td>
</tr>
<tr>
<td></td>
<td>It is important of the genetic because understand it.</td>
</tr>
<tr>
<td></td>
<td>No characteristic.</td>
</tr>
<tr>
<td></td>
<td>It help to understand the genotype and phenotype to the genetic. This is the very important to the understand and the genotype and phenotype is the observable trait an organism. and genotype is the genetic make up of an organism.</td>
</tr>
<tr>
<td></td>
<td>It help to understand the homologues and heterologues genetic, this is study genetic important in our daily life to understand the homologues and heterologues to the genetic when cross the genetic.</td>
</tr>
<tr>
<td></td>
<td>It help to the one of characteristics of the chromosome. This is the genetic is very important to the chromosome. Some is in the our daily life.</td>
</tr>
<tr>
<td></td>
<td>It help to understand the DNA and RNA. Because when the people study the genetic to be identify two and RNA the DNA is no double molecule but RNA is the single molecule also the genetic is very study our daily life.</td>
</tr>
</tbody>
</table>

**Extract 15.1:** One of the candidate’s poor response in question 15

Extract 15.1 the candidate wrote responses which relate to genetics but do not meet the question demand. For example, he/she wrote *it help to understand the characteristics of chromosomes.*

Despite the weak performance in this question, 6.4 percent of the candidates had good performance. The candidates correctly explained the importance of genetics in daily life implying that they had sufficient knowledge of the application of genetics. Extract 15.2 illustrates a response from the candidates who correctly answered the question.
Genetics is the study of hereditary and variations in organisms. Heredity is the passing of traits from parents to offspring, and variation is the difference which occurs between parents and offspring. A basic unit of genetics is a gene, which determines the trait or characteristic of an individual, e.g. human ribonucleic acid (RNA) and deoxyribonucleic acid (DNA). The following are the importance of solving genetic in our daily life:

It helps in genetic counselling. Genetic counselling involves giving advice to the partners and explaining on the diseases which can be transmitted to their offspring through a gene. For example, haemophilia, colour blindness and albinism so that they can avoid it if they are carriers.

It helps in genetic engineering. Genetic engineering is the alteration and modification of genes in an organism. Through genetic engineering, scientists or genetic engineers have been able to produce insulin from bacteria which can be inserted to a person with insulin deficiency.
Extract 15.2: A sample of candidate’s good response in question 15

Extract 15.2 shows a response of a candidate who was knowledgeable enough to give correct explanation why the study of genetics is important in our daily life. The candidates also had good command of the English Language and good essay writing skills.
3.0 ANALYSIS OF CANDIDATES’ PERFORMANCE IN EACH TOPIC

A total of seventeen (17) topics were examined in CSEE 2019. The analysis show that out of the assessed topics, question 1 had the highest performance of 66.5 percent. This was a multiple choice question with ten items derived from ten (10) topics which are: *Introduction to Biology, Safety in Our Environment, Nutrition, Balance of Nature, Transport of Materials in Living Things, Regulation, Growth, Coordination, Genetics,* and *Evolution.*

The topics with average performance were: *Classification of Living Things* (62.7%), *Safety in our environment* (62.2%), *Movement* (55.8%), *Health and Immunity* (48.7%) and *Introduction to Biology* (45.4%) which were examined in questions 14, 4, 2, 13 and 3 respectively.

The topics with weak performance were *Reproduction* (26.1%), *Genetics* (22.8%), *Nutrition* (21.4%), *Excretion* (20.8%), *Coordination* (11.8%), *Cell Structure and Organization* (10.3%), *Gaseous Exchange and Respiration* (6.9%), *Regulation* (6.1%), and *Transport of Material in Living Things* (4.8%) which were examined in question 7, 15, 6, 11, 5, 10, 9, 12 and 8, respectively.

The reasons for weak performance in the listed topics include misunderstanding of the question demand, inadequate knowledge, poor command of English language and misconception of biological terminologies. Appendix I summarizes the candidates’ performance in CSEE 2019 topic-wise.

Further observation reveals that, in comparing the performance of CSEE 2018 and 2019, in the CSEE 2019 the performance has improved from weak to good in the topic of *Classification of Living things.* However, the topics of *Health and Immunity* and *Introduction to Biology* have maintained its average performance. This implies that there were some efforts directed toward improving teaching and learning in Biology subject. On the other hand, the performance of the topics of *Excretion, Coordination* and *Transport of Materials in Living Things* has decreased from average in 2018 to weak in 2019. However, the topics of Reproduction, Genetics and Nutrition have maintained the weak performance. The comparison is summarized in Appendix II.
In the appendices, the performance of candidates in a topic is considered to be good, average or weak if the percentage of the candidates who scored from 30 percent or more of the marks allocated to the respective topic fell in the interval 65 to 100 (green), 30 to 64 (yellow) and 0 to 29 (red) respectively.

4.0 CONCLUSION

Generally, the performance of the candidates in Biology subject CSEE 2019 was average as 55.26 percent passed the examination. The analysis conducted on the candidates’ responses indicated that, good performance to some candidates was attributed to factors such as adequate knowledge, good understanding of the questions demand and good proficiency in the English language. On the other hand, weak performance to some candidates was attributed to factors such as:-

(a) Failure of the candidates to comprehend the demand of the question which caused them to give incorrect responses.

(b) Lack or insufficient knowledge of various concepts. This may have been due to insufficient laboratory work, field projects and use of appropriate teaching/learning aids which help the candidates to gain the intended competence.

(c) Poor command of English language which made the candidates to experience problems in expressing their concepts.

5.0 RECOMMENDATIONS

Based on the observations made through the candidates’ item response analyses report, the following recommendations are put forward for improvement of candidates’ performance in Biology subject.

(a) Teachers and students are advised to read the Candidates' Item Response Analysis report (CIRA). This will enable them to find the factors which affect candidates' responses and take appropriate measures in the classroom teaching - learning process so as to improve the candidates' performance.

(b) For the students to acquire enough competences of the topics with weak performance the following are recommended:
(i) For the topic of *Reproduction*, teachers should guide students to collect a variety of flowers and observe then draw and identify different parts of the flower and their functions.

(ii) For the topic of *Genetics*, teachers should use pictures/photographs/charts showing crops and livestock hybrids, samples of genetically modified food to lead a class discussion on the importance of genetics in biological science and related fields. This will enable them to understand well the concepts.

(iii) For the topic of *Nutrition*, teachers should invite guest speaker (health specialist) to talk on causes, symptoms, effects and control measures of the common disorders and diseases of the human digestive system. Students should summarize major points and the teacher to make clarifications and conclusions.

(iv) For the topic of *Excretion*, teachers should invite guest speaker (health specialist) to talk on causes, symptoms, effects and control measures of the complications and disorders of the excretory system.

(v) For the topic of *Cell Structure and Organization*, teachers should expose charts/models/slides of plant and animal cell / plant and animal tissues and organs and lead a class discussion on their functions during teaching and learning process.

(vi) For the topic of *Gaseous Exchange and Respiration*, teachers should provide charts/diagrams of the respiratory system and guide them in groups to discuss the features of respiratory system.

(vii) For the topic of *Regulation*, teachers should guide students in groups to perform experiments to determine the temperature of a frog/toad and a small mammal. Students are to divide the experimental animals into ectoderms and endoderms, and the teachers to lead a plenary discussion to clear out misconceptions.

(viii) For the topic of *Transport of Materials in Living Things*, teachers should guide students to carry out experiments to demonstrate upward and downward movement of materials in xylem and phloem then make clarifications and conclusions.
Appendix I


<table>
<thead>
<tr>
<th>S/N</th>
<th>Topic</th>
<th>Question Number</th>
<th>CSEE 2019</th>
<th>Remarks</th>
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<td>4.</td>
<td>Movement</td>
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<td>55.8</td>
<td>Average</td>
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<tr>
<td>5.</td>
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<td>Coordination</td>
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## Appendix II

### Comparison of the Candidates’ Performance topic-wise in CSEE 2018 and 2019

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<th>Remarks</th>
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<td>Percentage of Candidates With a Score of 30% or Above</td>
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