THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

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

033 BIOLOGY

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TABLE OF CONTENTS

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
EXCECUTIVE 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.

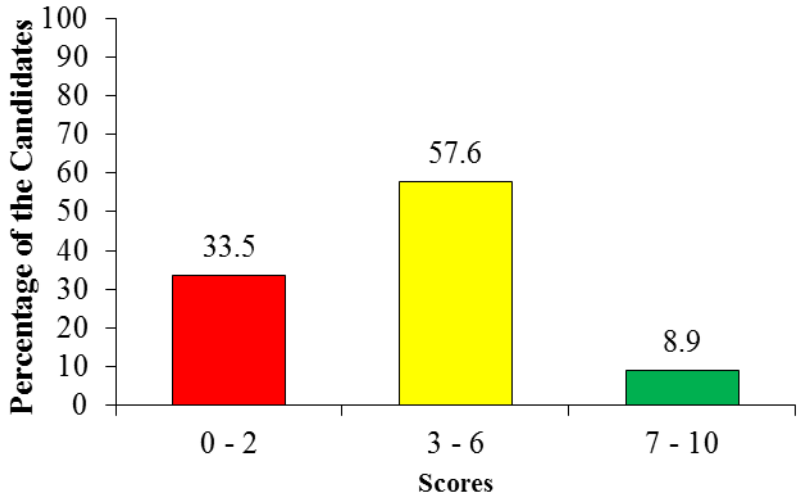


Figure 1: *The summary of the candidates' performance in question 1*

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* $\longrightarrow$ *Zebra* $\longrightarrow$ *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 *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 *A, a primary consumer* failed to understand that primary consumers are always herbivores which feed on green plants (producers). Those who selected *C, a producer* failed to realize that producers are organisms that make their own food such as grasses. Those who selected *D, a tertiary consumer* did not understand that these are organisms that feed on secondary consumers. Likewise, those who selected *E, a decomposer* failed to realize that decomposers are organisms such as bacteria and fungi which break down the dead and decayed organic matter.

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?*

A	*Root pressure*	*B*	*Transpiration pull*
C	*Cohesion forces*	*D*	*Adhesion forces*
E	*Capillarity*		

The correct response for this item is *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 *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 *C, Cohesion forces* and *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 *E, Capillarity* did not understand that capillarity is the condition that cause water to rise in narrow tubes called xylem vessels.

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

A	*Insulin*	*B*	*Glucagon*
C	*Antidiuretic*	*D*	*Aldosterone*
E	*Testosterone*		

The correct response for this item is *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:

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

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.

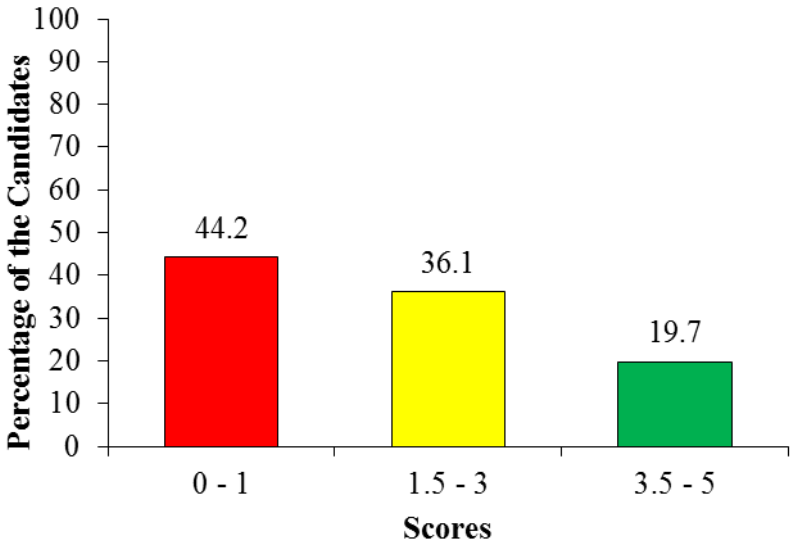
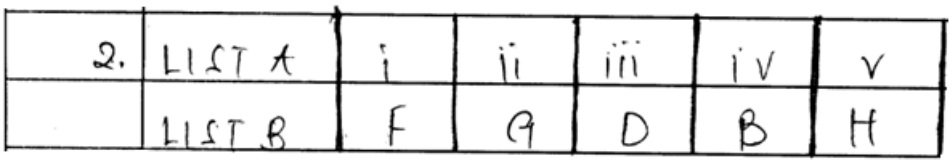


Figure 2: *The summary of candidates' performance in question 2*

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.



2.	LIST A	i	ii	iii	iv	v
	LIST B	F	G	D	B	H

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, 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.

2.	Lst A	i	ii	iii	iv	v
	Lst B	B	H	G	D	B

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.

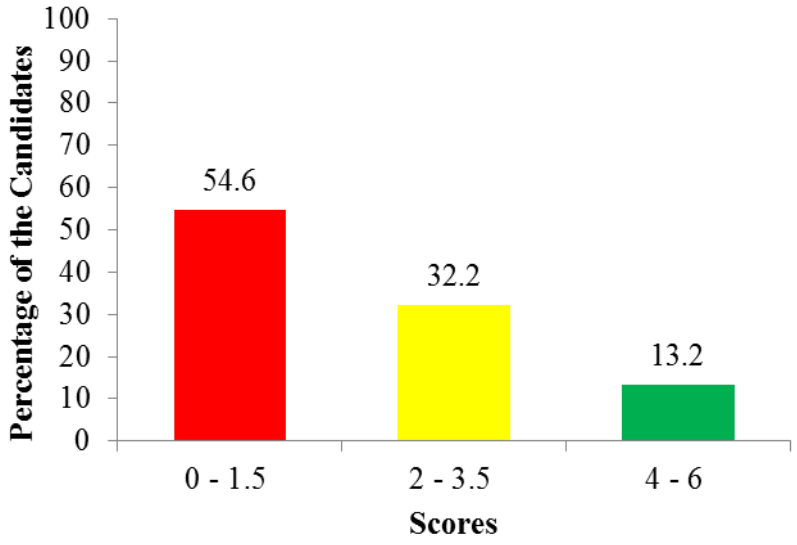
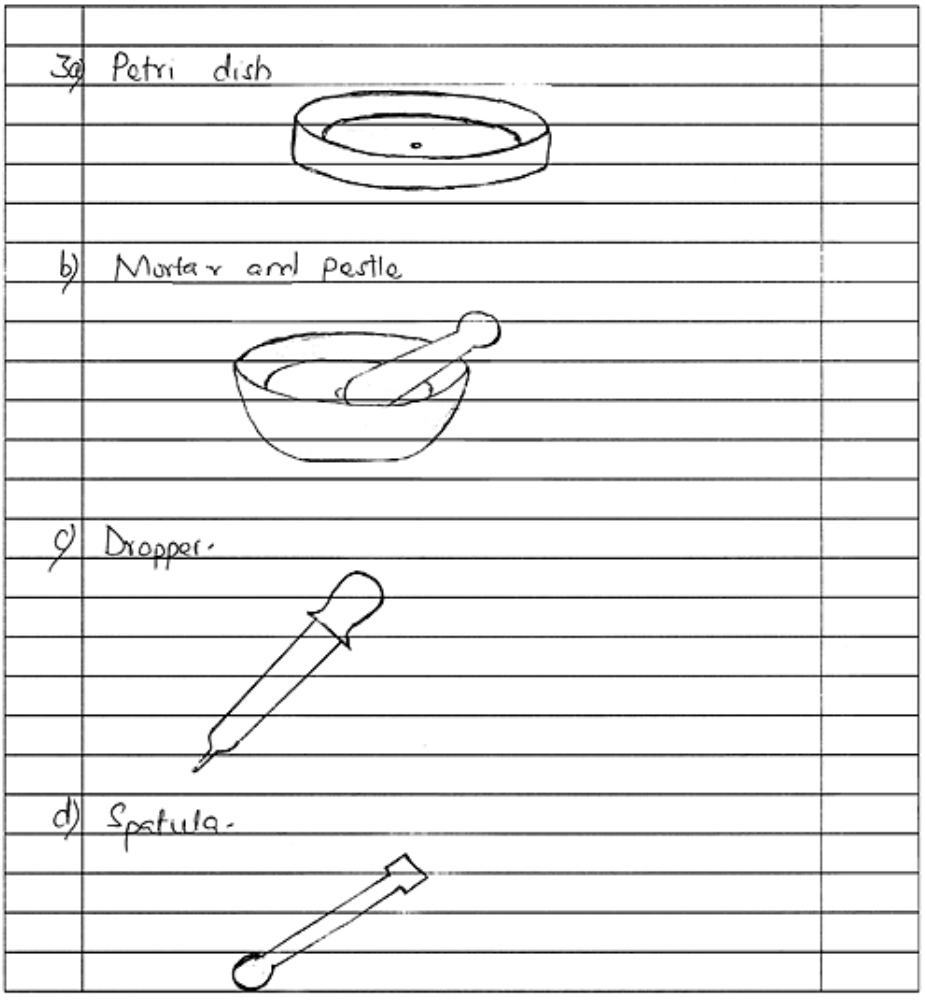


Figure 3: *Shows the candidates' performance in question 3*

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.

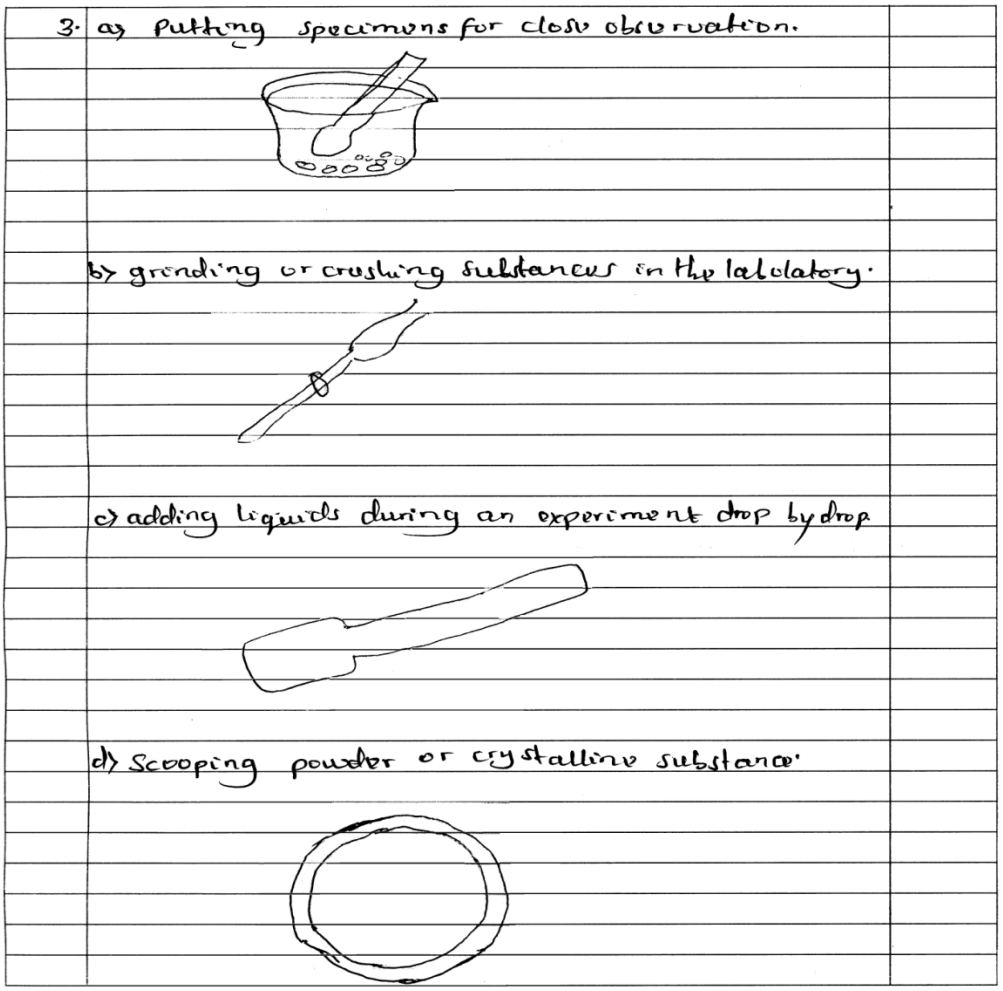
Despite the average performance, 13.2 percent of the candidates performed well in this question. They correctly identified and drew the required apparatuses. This indicates that, the candidates had adequate knowledge on the topic of Introduction to Biology. Extract 3.1 demonstrates a sample of the candidates'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

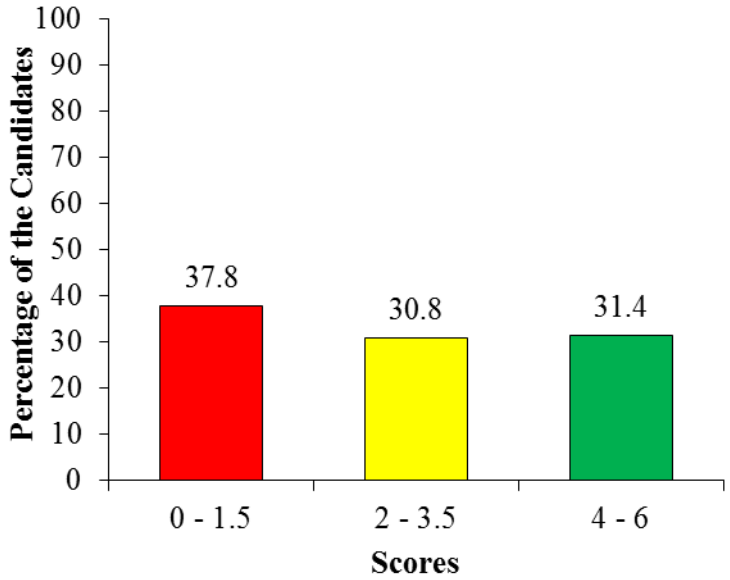
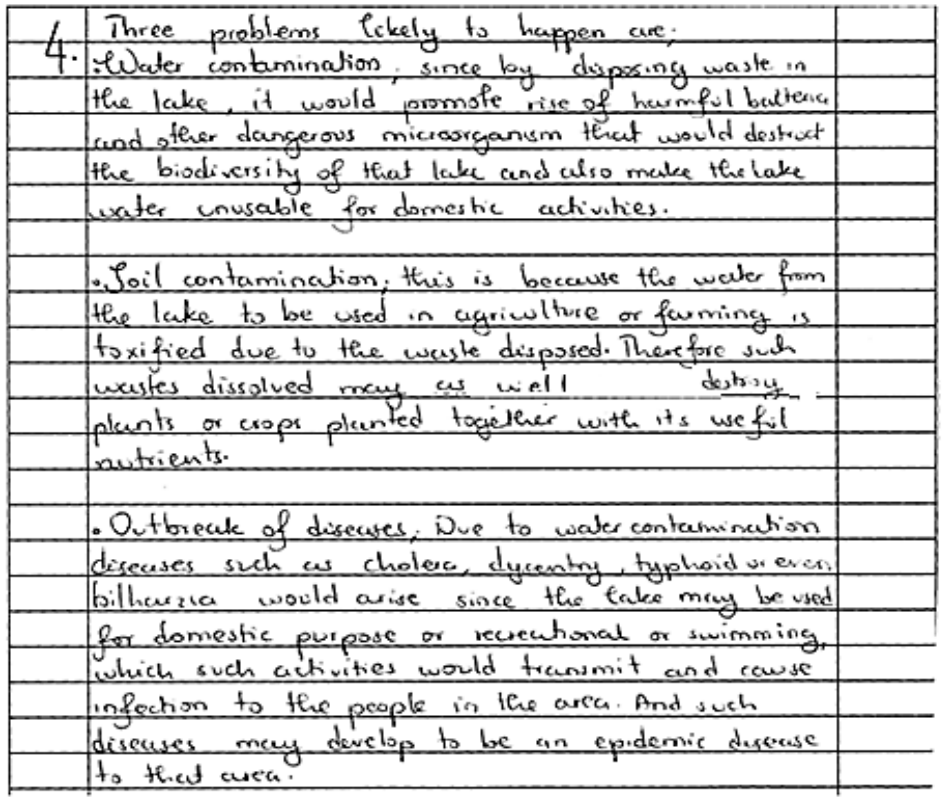


Figure 4: *The candidates' performance in question 4*

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.


4. Three problems likely to happen are;
:Water contamination, since by disposing waste in the lake, it would promote rise of harmful bacteria and other dangerous microorganism that would destruct the biodiversity of that lake and also make the lake water unusable for domestic activities.

•Soil contamination; this is because the water from the lake to be used in agriculture or farming is toxified due to the waste disposed. Therefore such wastes dissolved may as well destroy plants or crops planted together with its useful nutrients.

• Outbreak of diseases, Due to water contamination deseases such as cholera, dycentry, typhoid or even bilharzia would arise since the lake may be used for domestic purpose or recreational or swimming, which such activities would transmit and cause infection to the people in the area. And such deseases may develop to be an epidemic disease to that area.

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.

4. It has been observed that some people dispose waste around the lake which supplies water to the surrounding communities. to Explain three problem which are likely to happen to the area.

Reusing; when a problem hinder the supplies water because wear alot of waste in source of water after here water used was clean the environment and take going to Inderstand to produce another material for example tanks and other material

Recycling; as know that people was not to Clean the environment in waste now was a source of disease to the people and animal after here to Collecting the waste and going dampo to burn fire for peace and security in the environment

Reducing; because when dispose waste around the lake which supplies water wear removal produce to the surround the Communities in the environment pollution inorder to escape the many disease

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.

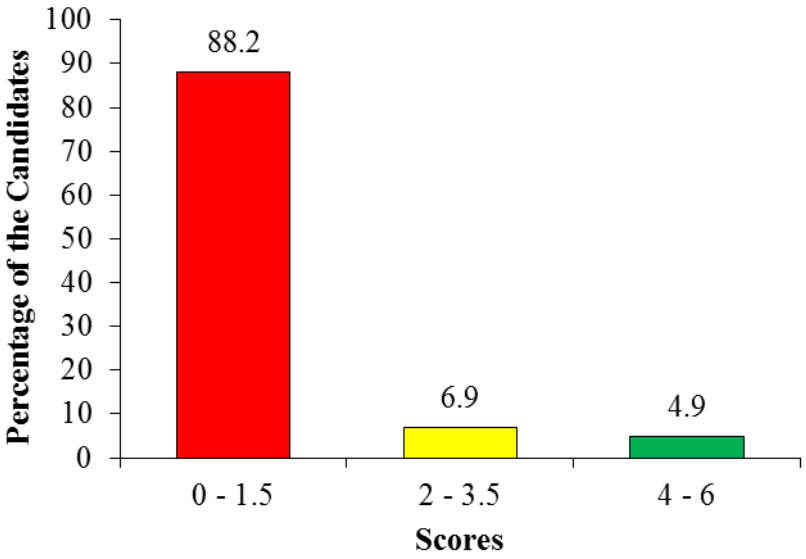


Figure 5: *Candidates' performance in question 5*

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.

5.		Nervous system	endocrine system
	(i)	It produce neuron to the product sensory, relay etc	It's produce the regula tion of organism.
	(ii)	It used put the information to the system of body for stimulus hormone.	It used put the information some part of body about gland s and other.
	(iii)	It produce hormone in the body	It produce glands into body.

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.

5.	Differences between nervous system and endocrine system.	
	Nervous system	Endocrine system
	i) Electrical impulse evoke a response in nervous system.	-Hormones evoke a response in endocrine system
	ii) Electrical impulses are transported through neurons in the nervous system.	-Hormones are transported through the bloodstream in the endocrine system.
	iii) The response is short-lived in the nervous system.	-The response is long-lasting in the endocrine system.

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.

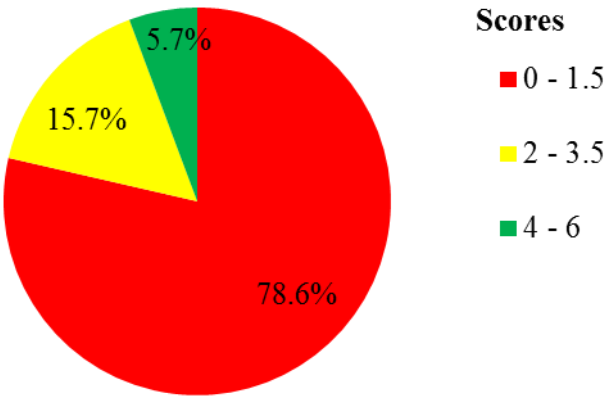
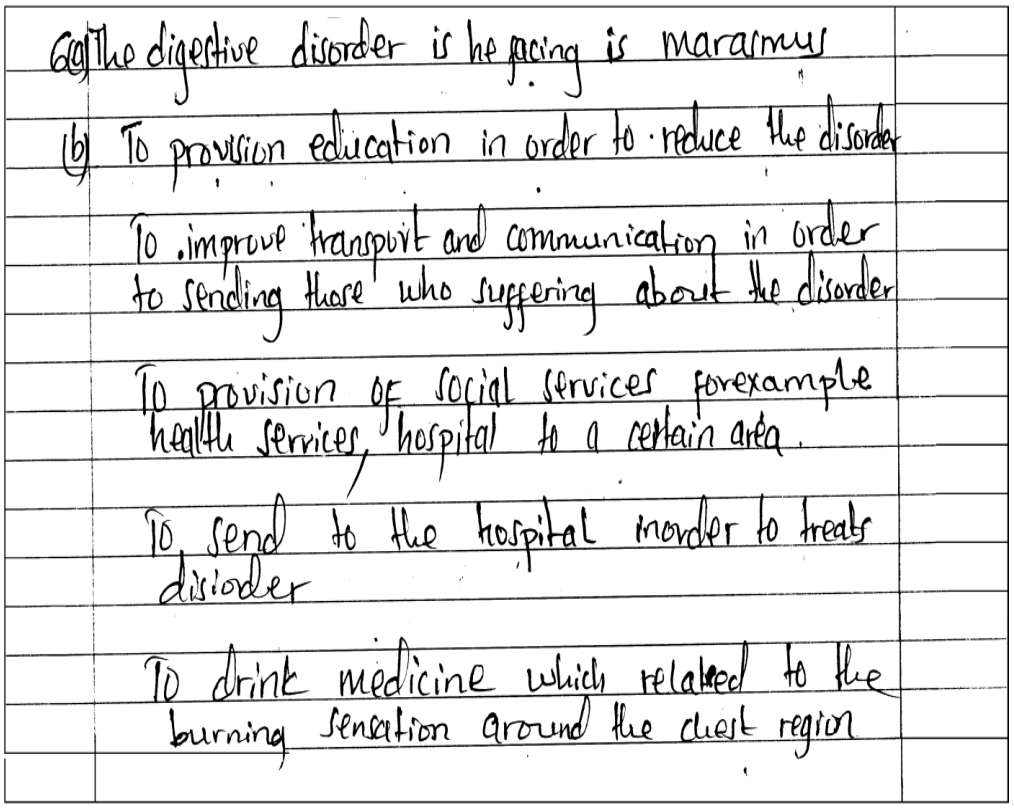


Figure 6: *Candidates performance in question 6*

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.


(a) The digestive disorder is he facing is marasmus

(b) To provision education in order to reduce the disorder

To improve transport and communication in order to sending those who suffering about the disorder

To provision of social services forexample health services, hospital to a certain area.

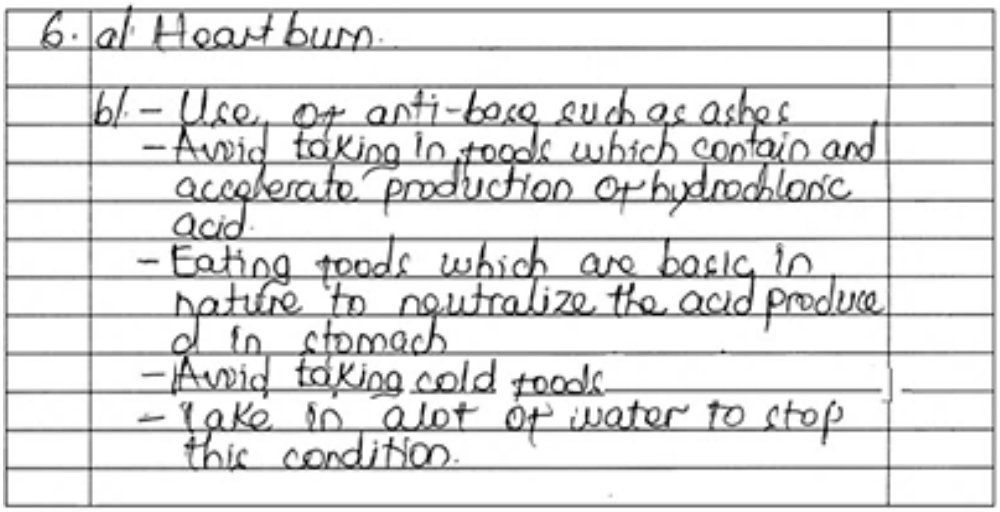
To send to the hospital inorder to treats disioder

To drink medicine which related to the burning sensation around the chest region

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:

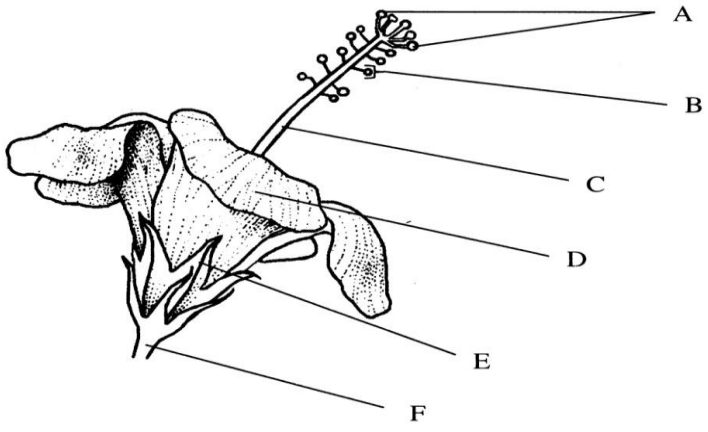


Figure 1

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.

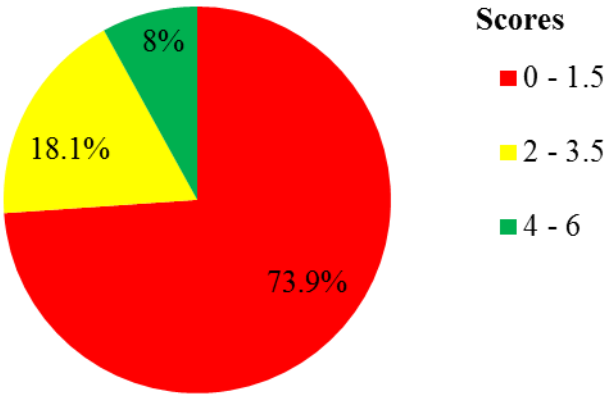
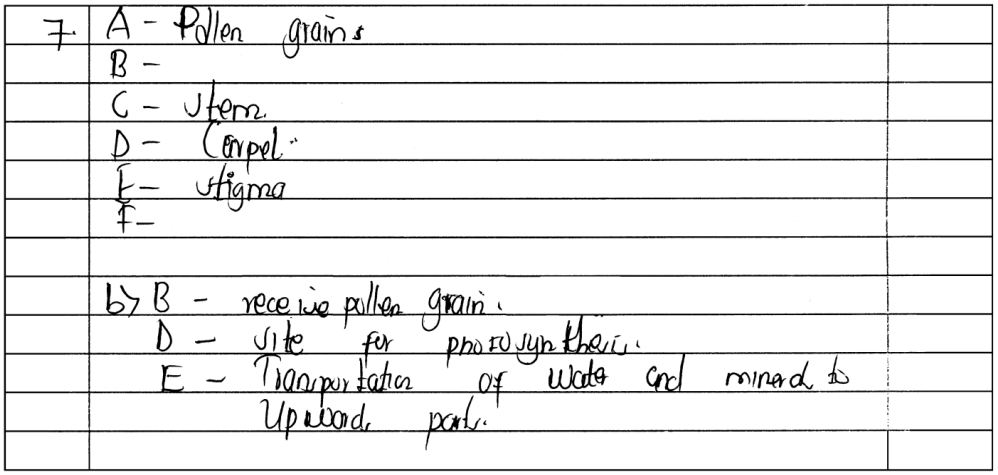


Figure 7: *The candidates' performance in question 7*

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.*

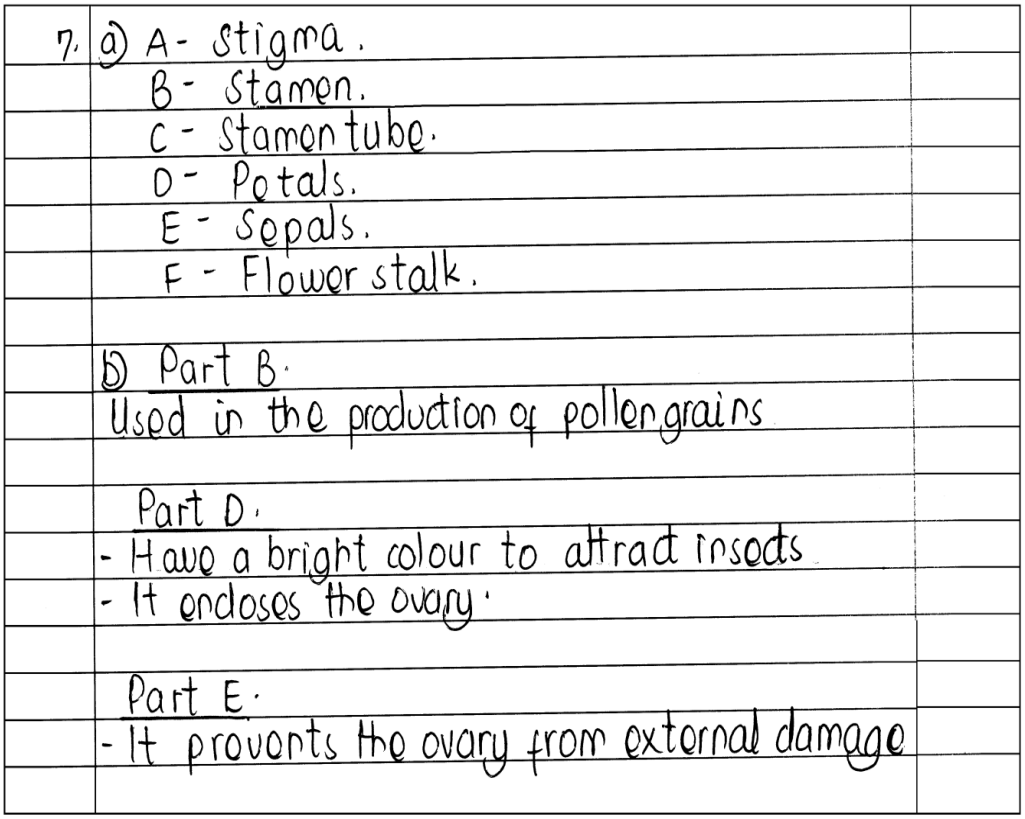
In part (b), some candidates failed to explain the functions of the parts labeled B, D and E. For example, some candidates wrote *B - it is used to attract insect to follow the flower, D - It is used to make flower open for the ovule to come out, E - Used to make the stalk flower to not to be the end.* 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.



Extract 7.1: Candidate's poor response in question 7

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.

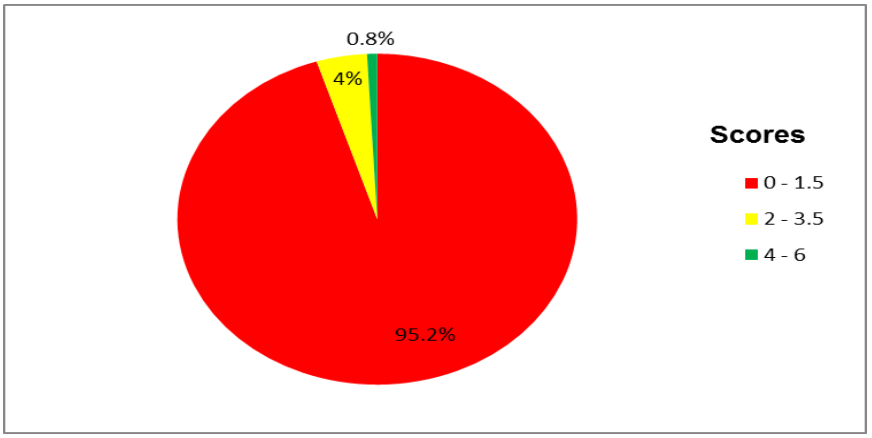
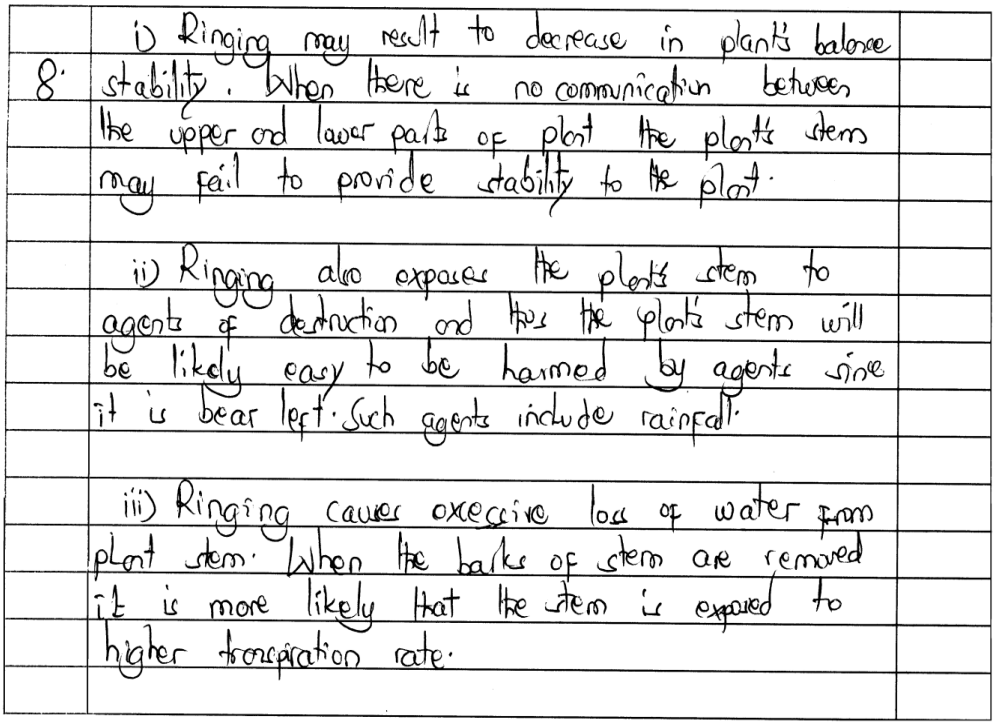


Figure 8: *Candidates performance in question 8*

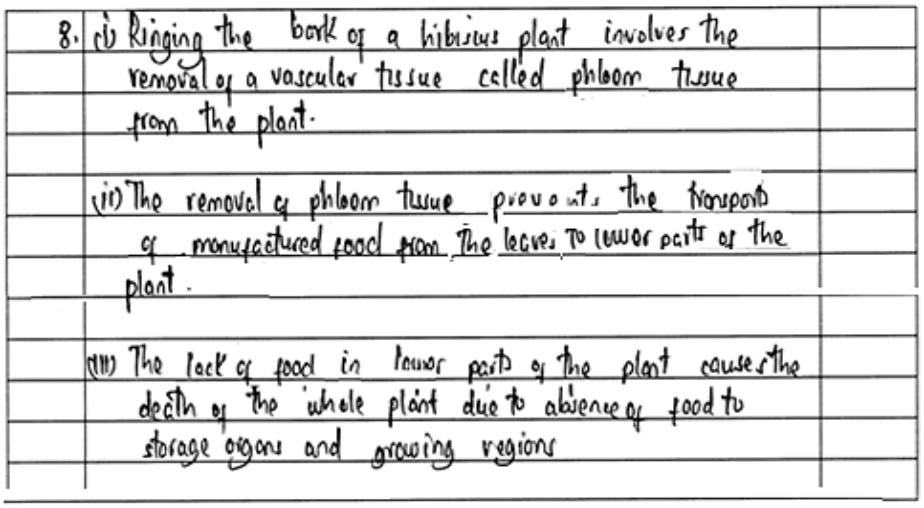
Figure 8 indicates that the candidates' performance in this question was weak since 95.2 percent scored from 0 to 2.5 out of 6 marks allocated to this question. Most of the candidates wrote incorrect elaboration of the impact of ringing in trees such as: *there will not be transportation of water in 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.

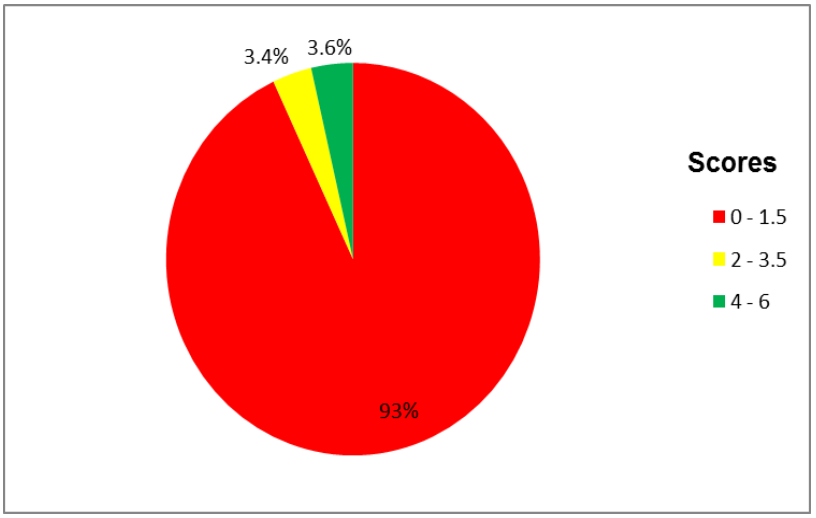
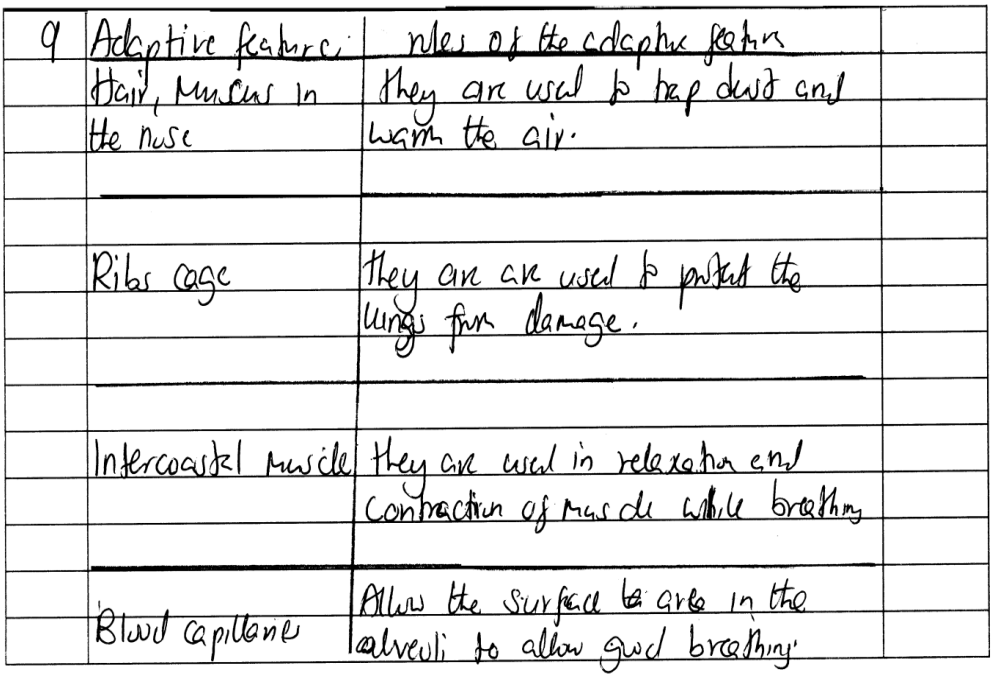


Figure 9: *Candidates performance in question 9*

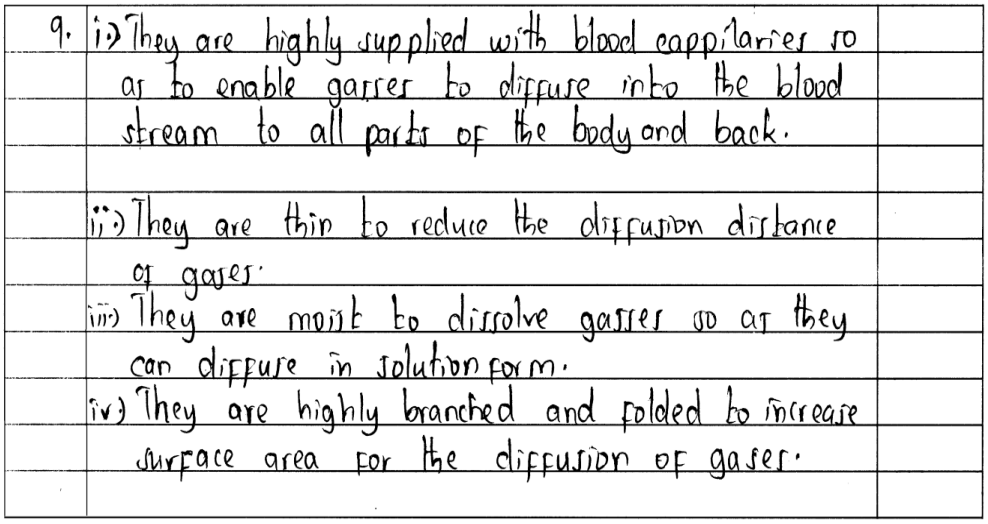
The analysis indicates that the candidates' performance in this question was weak since 88.1 percent scored from 0 to 1.5 out of 6 marks. Most of the candidates explained the factors affecting the rate of respiration instead of how the respiratory surfaces are adapted to their role. For instance, one 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.

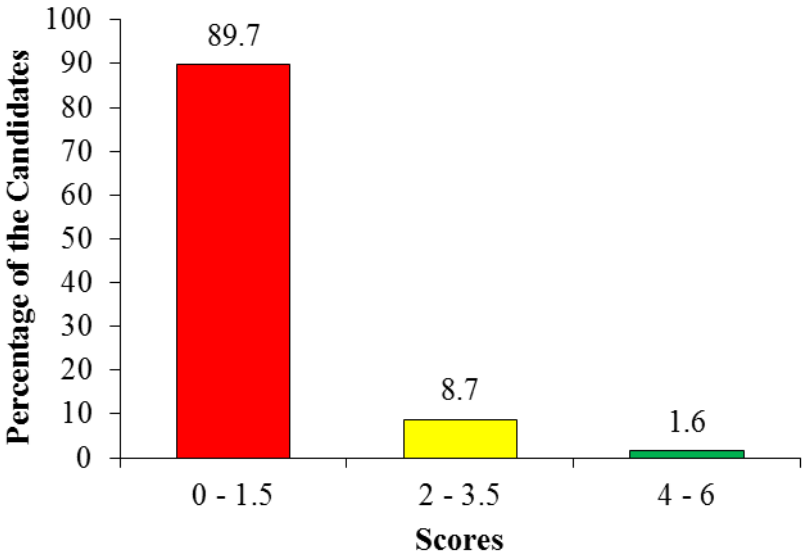


Figure 10: *Distribution of the candidates' performance in question 10*

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.

10. (a)	Differences between cell membrane and cell wall	
	CELL MEMBRANE	CELL WALL
	• Allow cell components like nucleus to be in specific position	– Gives definite shape of the cell
	• Allow materials to enter or move out of the cell easily	– Protect internal parts of cell and contain cellulase to digest cellulose in ruminants
(b)	Cell differentiation it is important to living organisms because help to identify types of cells either pryokariotic or eukaryotic and even plant cell or animal cell; that is why specialized animal cells like white blood cell, red blood cell and sperm cell can be indentified easily. – As well as speciallized plant cell include root hair cells, guard cell, palisade cell and xylem vessels are identified	

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.

10.	a)	Cell membrane	Cell wall	
		a) It is semi permeable membrane which allow specific substrate	It is permeable to everything such as water, mineral salt and other	
		b) It contain living cell materials and protector the inner Organelles	It contain non living materials and protect the whole organism	
	b) Cell differentiation is important to living organisms as it helps in the specialization of the cell to its specific function and thus avoid interference between cell in a specific organism.			

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.

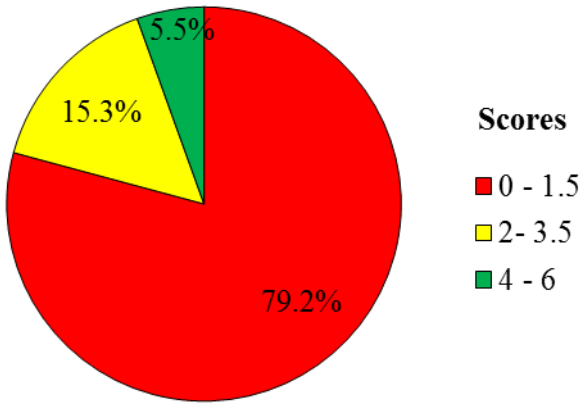
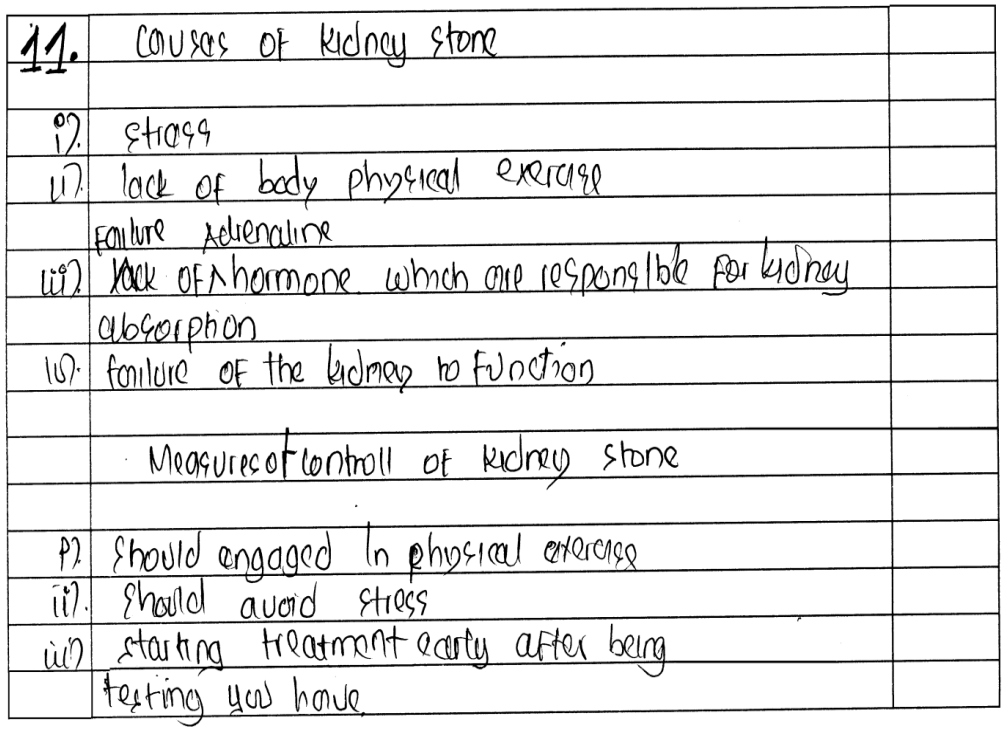


Figure 11: *Distribution of candidates' performance in question 11*

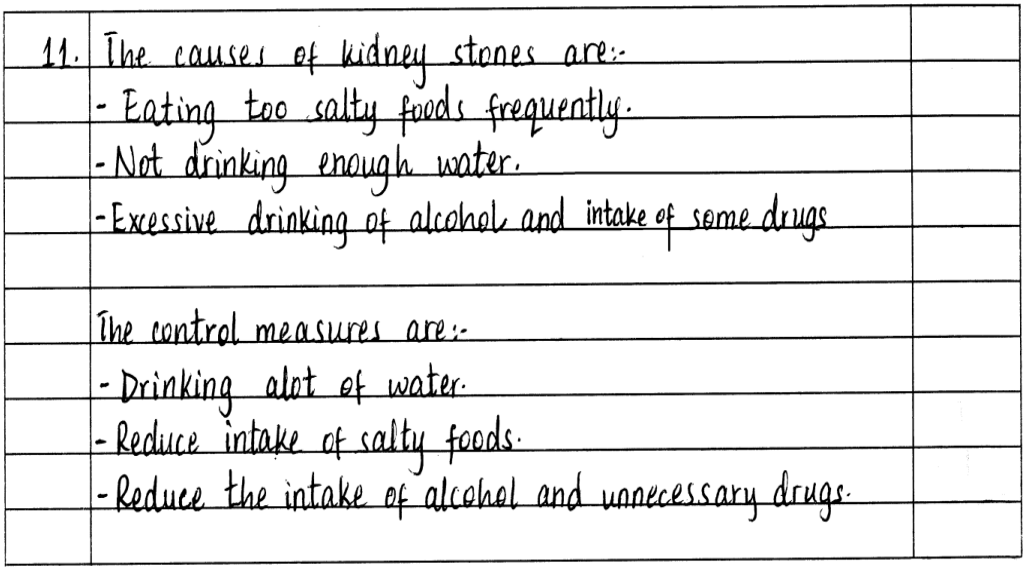
Figure 11 shows that the general performance in this question was weak since 79.2 percent of the candidates scored low marks. Most of the candidates wrote incorrect causes and control measures of kidney stones. Examples of incorrect responses given on the causes are; *taking stones into the body through 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

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.

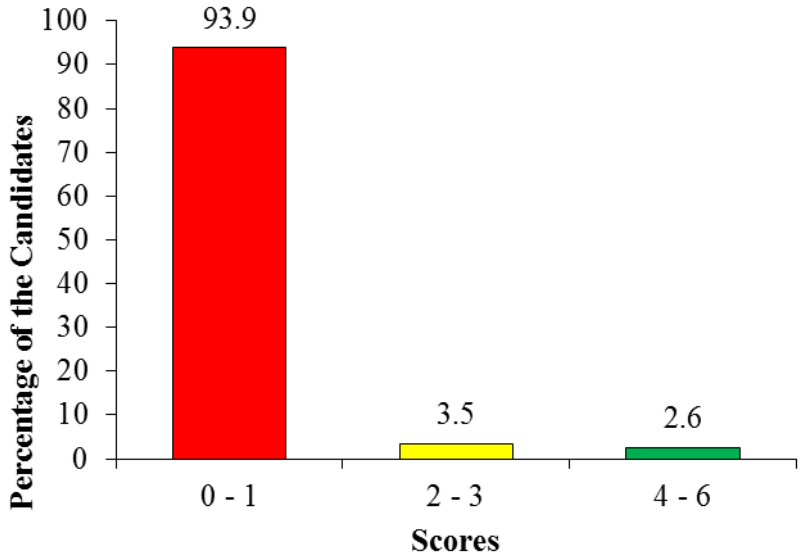


Figure 12: *Candidates performance in question 12*

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.

12. Ways that help reptile to survive in different weather condetions.

(i) Has hard skin, this way of having hard skin help organism to survive in different weather condetion because hard skin can not allow temperature to affect the organism and that help reptile to survive in different weather condetion

(ii) Cold blooded, this way cause the organism to survive in different weather condetion reptiles are cold blooded animals that cold blood can make reptiles to survive in different weather condetion either cold climate or hot climate

(iii) Ability of doing gaseous exchange, also reptiles are able to do gaseous exchange by gills, skin and lungs all this help them to survive in different weather condetion.

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.

12: The ways which help reptiles to survive in different weather conditions involves;

(a) Hibernation

- This is a process whereby some reptile go into a deep sleep during the cold weather Conditions. Reptiles do hibernate and redule their metabolic activities so as to survive during the cold weather Conditions.

(b) Aestivation.

- This is the process whereby some reptile go into a deep sleep in the burrows during the hot weather Conditions. The reptile aestivate so as to escape from very hot Conditions which lead death of a reptile.

(c) 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.

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.

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.

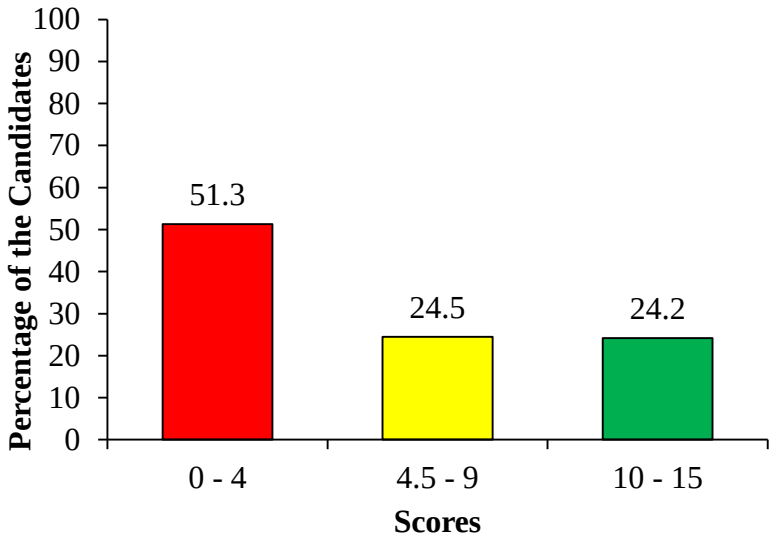


Figure 13: *Distribution of the candidates' performance in question 13*

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 (STD_S). 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.

13. HIV/AIDs is a pandemic diseases that only affects humans. The diseas AIDS is caused by a virus called Human immuno-deficiency virus (HIV). These virus usually attacks the helper T-cells thus lowering body defense system or body immunity. The following are the symptoms of a person suffering from HIV/AIDs:

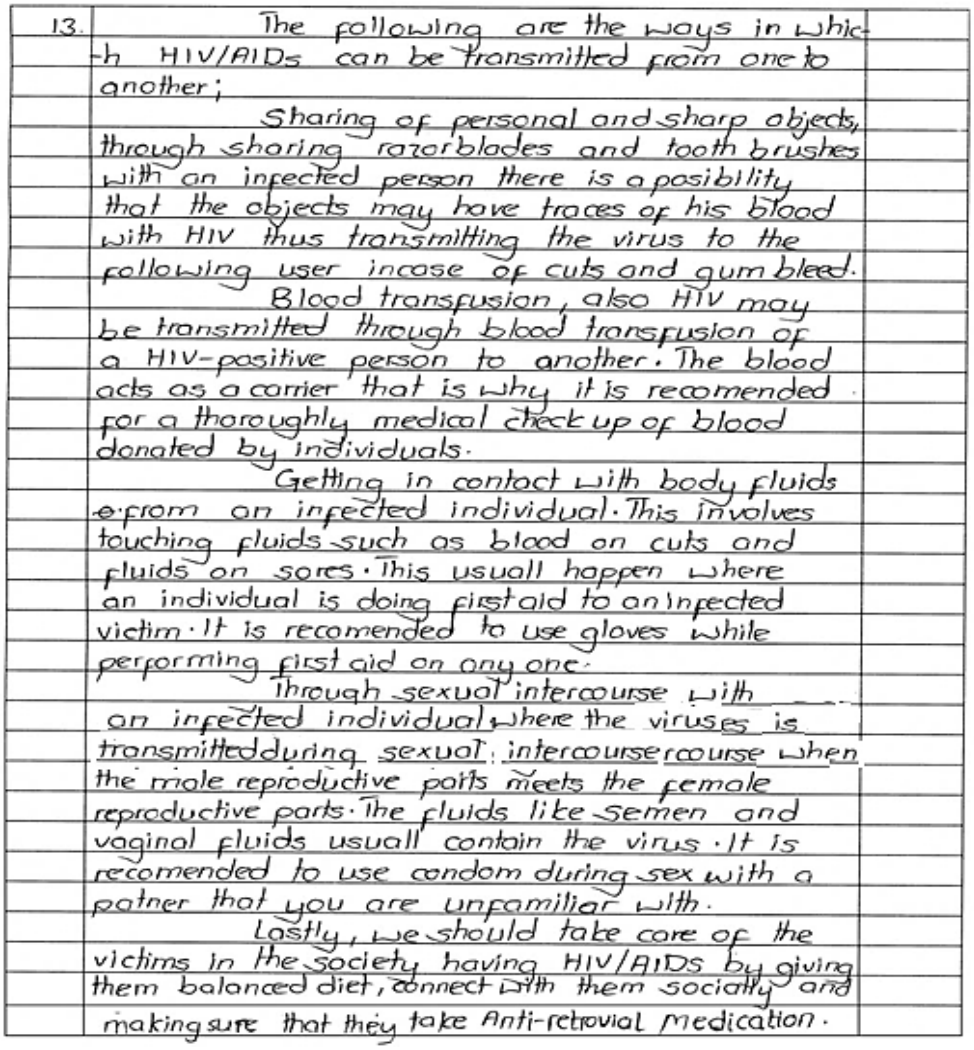
Loss of appetite, this a situation where by the victim doesnot find any food appetizing. And if the victim doesnot eat food then his/her body would have no energy causing further deterioration of body immunity.

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 feaces. This is due to the digestive system especiacaly 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 looses weight up to 5kg 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.


13. The following are the ways in which HIV/AIDs can be transmitted from one to another;

Sharing of personal and sharp objects, through sharing razorblades and tooth brushes with an infected person there is a posibility that the objects may have traces of his blood with HIV thus transmitting the virus to the following user incase of cuts and gum bleed.

Blood transfusion, also HIV may be transmitted through blood transfusion of a HIV-positive person to another. The blood acts as a carrier that is why it is recomended for a thoroughly medical check up of blood donated by individuals.

Getting in contact with body fluids from an infected individual. This involves touching fluids such as blood on cuts and fluids on sores. This usuall happen where an individual is doing first aid to an infected victim. It is recomended to use gloves while performing first aid on any one.

through sexual intercourse with an infected individual where the viruses is transmitted during sexual intercourse when the male reproductive parts meets the female reproductive parts. The fluids like semen and vaginal fluids usuall contain the virus. It is recomended to use condom during sex with a patner that you are unfamiliar with.

Lastly, we should take care of the victims in the society having HIV/AIDS by giving them balanced diet, connect with them socially and making sure that they take Anti-retrovial medication.

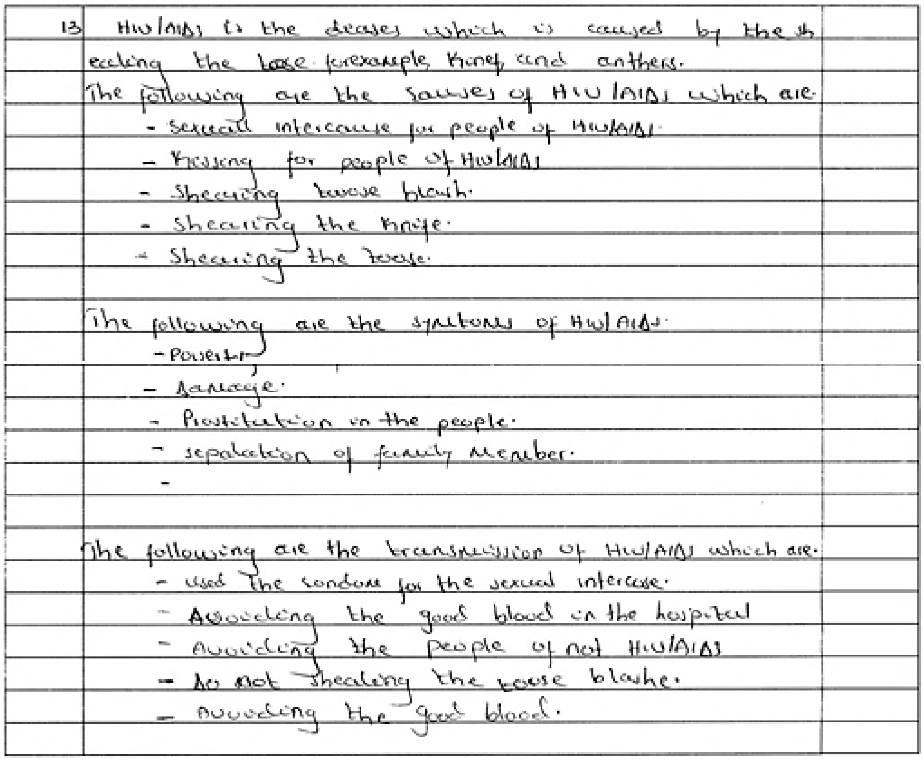
Extract 13.1: Candidates' good response in question 13

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 *pain in joints, loss of appetite, chills* and *dizziness.* Likewise, on the ways of transmitting the disease one wrote incorrect responses such as *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.



13 HIV/AIDS is the deases which is caused by the sh eacking the kase. forexample, Kinef, and anthers.
The following are the sauses of HIV/AIDS which are.
- Sexuall intercause for people of HIV/AIDS.
- Kissing for people of HIV/AIDS
- Sheaving loose blash.
- Sheaving the knife.
- Sheaving the kase.

The following are the syntoms of HIV/AIDS.
- Poverty
- Damage.
- Prostitution in the people.
- sepalation of family member.
-

The following are the transmission of HIV/AIDS which are.
- used The condom for the sexual intercose.
- Avoiding the good blood in the hospital
- Avoiding the people of not HIV/AIDS
- do not sheating the loose blashe.
- Avoiding the good blood.

Extract 13.2: Candidate' poor response in question 13

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

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.

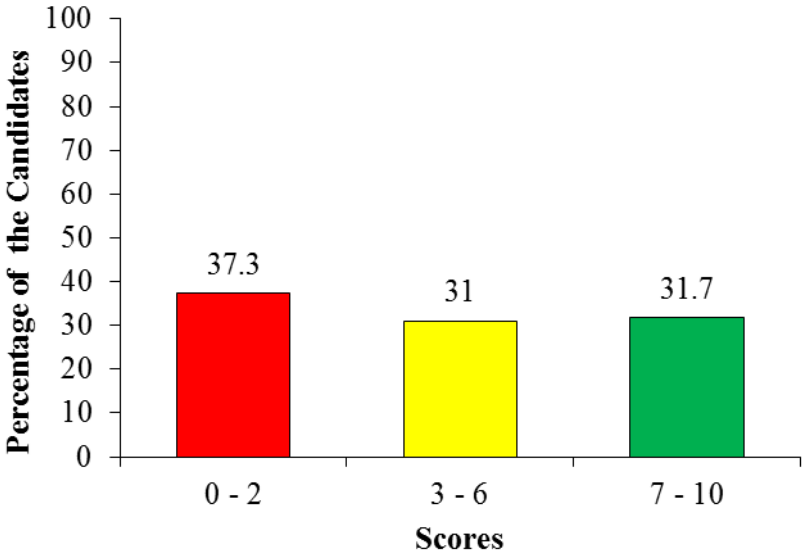


Figure 14: *The candidates' performance in question 14*

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

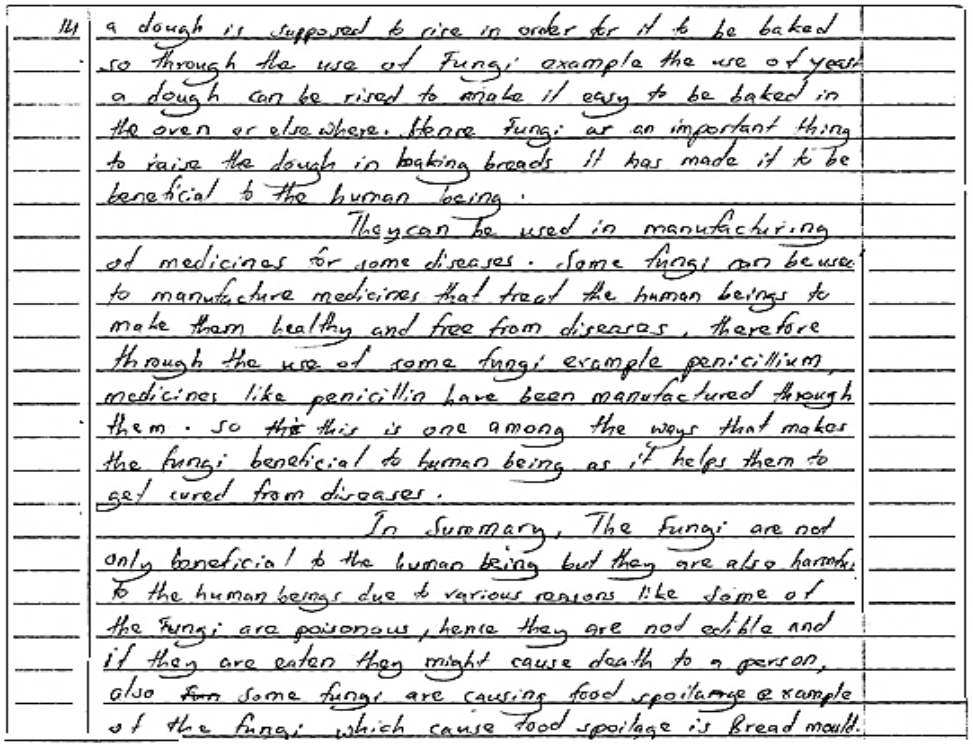
adequate knowledge of the topic of Classification of Living Things specifically Kingdom Fungi. Extracts 14.1 illustrates a sample of candidate's good response.

14. Fungi are the organisms which are found in the ~~kind~~ kingdom fungi and their distinctive feature is the possession of hyphae and their body made of chitin 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 sources of food that provide nutrients to the human being to keep him alive. Hence fungi as a 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 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 needs. hence fungi as a source of manufacture of alcohol in industries its the way to maked it beneficial to human being.

They can be ~~used~~ used in baking to raise the doughs. In baking processes like bread baking


14) a dough is supposed to rise in order for it to be baked so through the use of fungi example the use of yeast a dough can be rised to make it easy to be baked in the oven or else where. Hence fungi ar an important thing to raise the dough in baking breads it has made it to be beneficial to the human being.

They can be used in manufacturing of medicines for some diseases. Some fungi can be used to manufacture medicines that treat the human beings to make them healthy and free from diseases, therefore through the use of some fungi example penicillium, medicines like penicillin have been manufactured through them. so this this is one among the ways that makes the fungi beneficial to human being as it helps them to get cured from diseases.

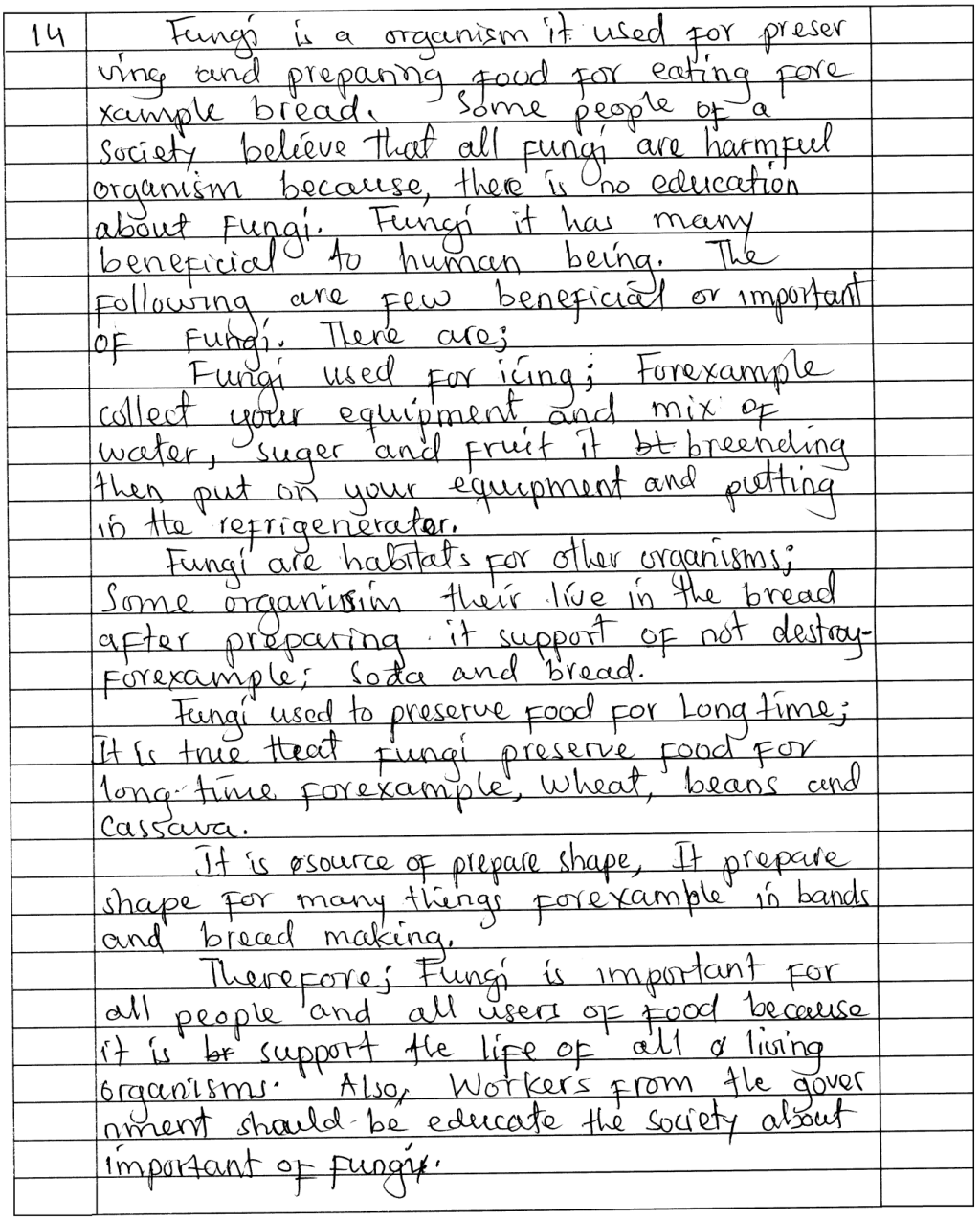
In Summary, The fungi are not only beneficial to the human being but they are also harmful to the human beings due to various reasons like some of the fungi are poisonous, hence they are not edible and if they are eaten they might cause death to a person, also ~~from~~ some fungi are causing food spoilage example of the fungi which cause food spoilage is Bread mould.

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 preser ving and preparing food for eating fore xample bread. Some people of a society believe that all fungi are harmful organism 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; Forexample collect your equipment and mix of water, suger and fruit it ~~bt~~ breeneling then put on your equipment and putting in the refrigeneratar.

Fungi are habitats for other organisms; Some organisim their live in the bread after preparing it support of not destray- forexample; Soda and bread.

Fungi used to preserve food for Long time; It is true theat fungi preserve food for long time forexample, Wheat, beans and cassava.

It is esource of prepare shape, It prepare shape for many things forexample in bands and bread making.

Therefore; Fungi is important for all people and all users of food because it is ~~bt~~ support the life of all a living organisms. Also, Workers from the gover nment 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.

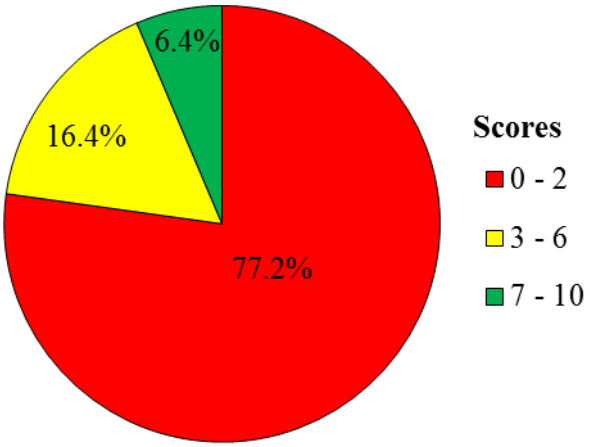
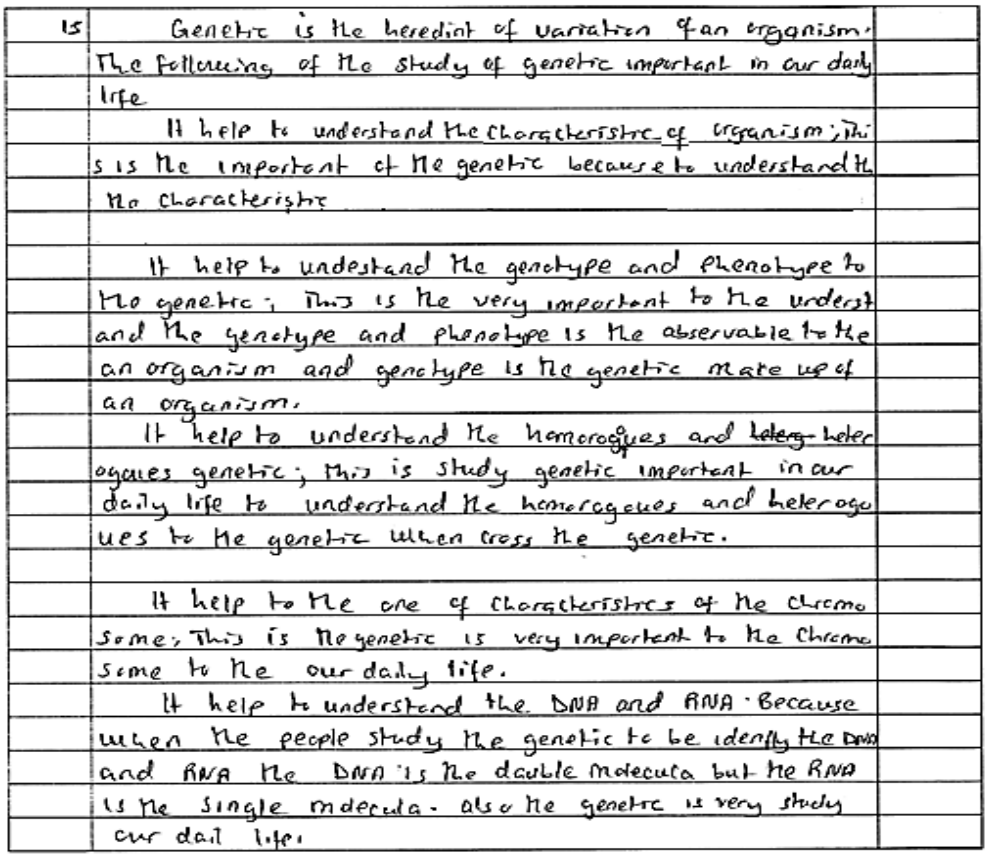


Figure 15: *Shows the candidates performance in question 15*

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.


15 Genetic is the heredint of variation of an organism. The following of the study of genetic important in our daily life

It help to understand the characteristic of organism; this is the important of the genetic because to understand the the characteristic

It help to undestand the genotype and phenotype to the genetic; This is the very important to the underst and the genotype and phenotype is the observable to the an organism and genotype is the genetic make up of an organism.

It help to understand the homerogques and ~~heterg~~ heter ogaues genetic; this is study genetic important in our daily life to understand the homerogeues and heterogo ues to the genetic when cross the genetic.

It help to the one of characteristics of the chromo some; This is the genetic is very important to the chrome some to the our daily life.

It help to understand the DNA and RNA · Because when the people study the genetic to be identify the DNA and RNA the DNA is the double molecula but the RNA is the single molecula · also the genetic is very study our dail life.

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.

15. Genetics is the study of hereditary and variations in organisms. Hereditary is the passing of traits from parents to offsprings and variation is the difference which occur between parents and offsprings. A basic unit of genetics is a gene which determine the trait or characteristics of an individual, a gene has ribonucleic acid (RNA) and deoxyribonucleic acid (DNA). The following are the importance of studing genetics 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 offsprings 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 isolation 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.

15. It helps in blood transfusion. Blood transfusion is the transfer of blood from the donor to the recipient, genetics is applied to check the blood groups of individuals weather is group A^+, A^-, B, AB or O so that during blood transfusion agglutination which is the clamping of blood cells can be avoided so as to save the life of an individual who receive the blood from the donor.

It helps in plant and animal breeding. Breeding involves production of new ones. Genetics is used to produce breeds of high quality by selecting organisms which will be, interbreeded, the organisms chosen have good qualities hence the offspring produced after the breeding process is viable, strong and resistant to diseases and harsh conditions, hence getting good yields and in plants, plants from different places can be crossed together to produce high-resistant plant.

To conclude the discovery of genetics has enabled man to know different structures and processes which occur in the body of an organism, some scientists include Mendel studied genetics and he is called the father of genetics, he discovered about the basic structure called a gene which easen study of genetics till today, even machines have been discovered so as to easen the study of genetics, therefore genetics is very important in our daily lives.

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

A summary of the candidates' performance topic-wise in CSEE 2019.

S/N	Topic	CSEE 2019		
		Question Number	**Percentage of the candidates with a Score of 30% or Above**	**Remarks**
1.	Introduction to Biology, Safety in Our Environment, Nutrition, Balance of Nature, Transport of Materials in Living Things, Regulation, Growth, Coordination, Genetics and Evolution.	1	66.5	Good
2.	Classification of Living Things	14	62.7	Average
3.	Safety in Our Environment	4	62.2	Average
4.	Movement	2	55.8	Average
5.	Health and Immunity	13	48.7	Average
6.	Introduction to Biology	3	45.4	Average
7.	Reproduction	7	26.1	Weak
8.	Genetics	15	22.8	Weak
9.	Nutrition	6	21.4	Weak
10.	Excretion	11	20.8	Weak
11.	Coordination	5	11.8	Weak
12.	Cell Structure and Organization	10	10.3	Weak
13.	Gaseous Exchange and Respiration	9	6.9	Weak
14.	Regulation	12	6.1	Weak
15.	Transport of Materials in Living Things	8	4.8	Weak

Appendix II

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

SN	Topic	CSEE 2018			CSEE 2019		
		Question number	Percentage of Candidates With a Score of 30% or Above	Remarks	Question number	Percentage of Candidates With a Score of 30% or Above	Remarks
1.	Introduction to Biology, Safety in Our Environment, Nutrition, Balance of Nature, Transport of Materials in Living Things, Regulation, Growth, Coordination, Genetics and Evolution	1	92.57	Good	1	66.5	Good
2	Classification of Living Things	1	11.9	Weak	1	62.7	Average
3	Safety in Our Environment				1	62.2	Average
4	Movement				1	55.8	Average
5	Health and Immunity	1	62.8	Average	1	48.7	Average
6	Introduction to Biology	1	61.9	Average	1	45.4	Average
7	Reproduction	1	15.2	Weak	1	26.1	Weak
8	Genetics	1	24.5	Weak	1	22.8	Weak
9	Nutrition	1	14.4	Weak	1	21.4	Weak
10	Excretion	1	45.1	Average		20.8	Weak
11	Coordination	1	64.1	Average	1	11.8	Weak
12	Cell Structure and Organization				1	10.3	Weak
13	Gaseous Exchange and Respiration				1	6.9	Weak
14	Regulation				1	6.1	Weak
15	Transport of Materials in Living Things	1	31.4	Average		4.8	Weak