THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CANDIDATES' ITEM RESPONSE ANALYSIS REPORT ON THE CERTIFICATE OF SECONDARY EDUCATION EXAMINATION (CSEE) 2022

BIOLOGY

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033 BIOLOGY

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TABLE OF CONTENTS

FOREWORD

This report presents Candidates' Items Response Analysis (CIRA) on the Certificate of Secondary Education Examination (CSEE) which was conducted in November 2022. The report aims to provide feedback to all educational stakeholders on the factors that contributed to the candidates' performance in Biology.

The Certificate of Secondary Education Examination 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. This analysis shows justification for the candidates performance in the Biology subject. The report shows that the candidates' who attained high scores had adequate knowledge about the assessed topics, ability to understand the demands of the questions, adequate drawing skills, and good mastery of the English language. It was established that factors such as lack of adequate knowledge in the respective topics, provision of responses which were contrary to the task of the question, lack of adequate drawing skills, and poor proficiency in the English language contributed to weak performance in some of the candidates.

The National Examinations Council of Tanzania (NECTA) expects that the feedback provided in this report will enable the education stakeholders to identify proper measures to improve teaching and learning of the Biology subject. Consequently, candidates will acquire knowledge, skills and competences indicated in the syllabus for better performance in future examination.

The Council appreciates the contribution of all those who prepared this report.

Dr. Said Ally Mohammed
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report focuses on the Candidates Item Responses Analysis (CIRA) for the candidates who sat for Certificate of Secondary Education Examination (CSEE) in Biology subject which was done in November 2022. The examination paper consisted of questions which were intended to measure candidates' competences on the content stipulated in the 2005 Biology syllabus, reprinted in 2013. The CSEE Biology paper was set in accordance with the NECTA format issued in 2019.

The Biology examination had two papers, namely 033/1 Biology 1 (Theory Paper) and 033/2 Biology 2 (Actual Practical Paper). The theory paper consisted of fifteen questions divided into sections A, B and C, with a total of 100 marks. The practical paper had three (3) alternative papers: 033/2A Biology 2A, 033/2B Biology 2B, and 033/2C Biology 2C. Each alternative paper consisted of two structured questions, each weighing 25 marks thus making a total of 50 marks.

The analysis showed that, the general performance in Biology CSSE 2022 was good because 353,046 (67.84%) candidates passed. The candidates' performance in grades was as follows: A - 21,518 (6.09%), B - 34,077, (9.65%), C - 134,555 (38.11%) and D - 162,896 (46.14%). However, 167,353 (32.16%) candidates failed by scoring F grade. The performance in the CSEE 2022 has increased by 0.61 per cent when compared to CSEE 2021 Biology, where 325,656 (67.23%) candidates passed out of 484,398 who sat for the paper.

The analysis of candidates' performance on each question in Biology subject paper begins by indicating the topic, demand of the question and the percentage of the candidates who attempted the question. It also highlights misconceptions observed on candidates' responses and spots some possible reasons for the observed misconceptions. The samples of the candidates' responses have been inserted as extracts to illustrate correct and incorrect responses. In addition, some charts and graphs have been used to illustrate candidates' performance on each question. The performance is considered to be good, average, or weak if the percentage of the candidates who scored at least 30 per cent of the marks allocated in a question fell within the range of 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 weak performance, respectively.

The next part analyses the performance of the candidates in each question in 033/1 Biology 1 (Theory Paper) and 033/2 Biology 2 (Actual Practical Paper).

2.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE IN EACH QUESTION IN 033/1 - BIOLOGY 1

This section analyses the candidates' performance in each question in sections A, B and C.

2.1 SECTION A: Objective Questions

The section consisted of questions 1 and 2, which were multiple choice and matching items, respectively. The candidates were instructed to answer all the 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 answer from among the given five alternatives and write its letter besides the item number in the answer booklet provided. The items were set from 10 topics, namely Coordination, Safety in Our Environment, Excretion, Genetics, Growth, Evolution, Transport of Materials in Living Things, Classification of Living Things, Movement, and Cell Structure and Organisation.

The question was attempted by 521,963 (100%) candidates. The analysis shows that 93,579 (17.93 %) candidates scored from 0 to 2 marks out of whom, 7,503 (1.44%) scored 0 in this question. The candidates who scored from 3 to 6 marks were 359,243 (68.82 %) whereas 69,141 (13.25%) scored from 7 to 10 marks. Further analysis shows that 1,510 (0.29%) candidates scored the full marks (10) in this question. Figure 1 summarizes the candidates' performance in question 1.

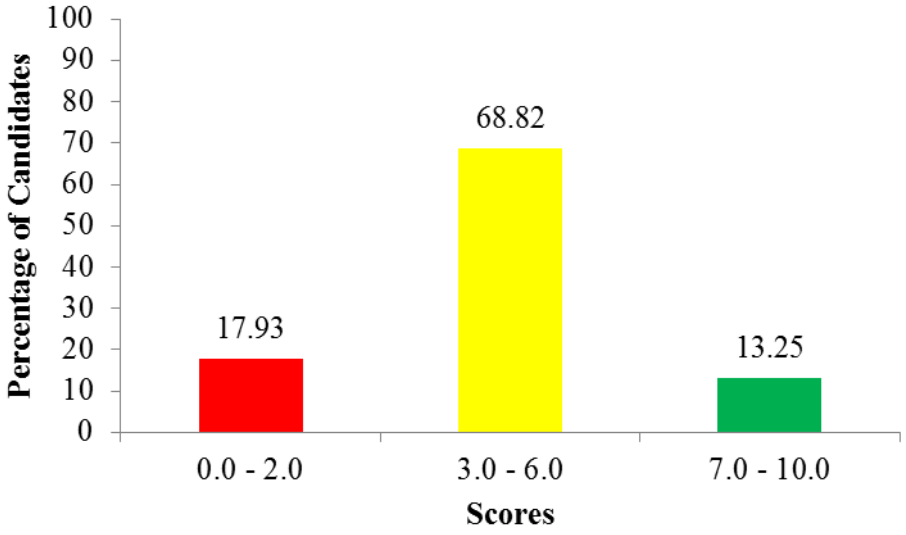


Figure 1: *Candidates' Performance in Question 1*

Figure 1 shows that the candidates' performance on this question was good because 82.07 per cent of the candidates scored from 3 to 10 marks. The candidates who scored high marks (7 - 10) had adequate knowledge of the concepts tested. Therefore, they provided correct responses to all or most of the items. Those who scored average marks (3 - 6) provided correct responses for 3 to 6 items, hence could not score full marks. Moreover, those who scored low marks (0 - 2) they either provided correct responses to 2 items or provided incorrect responses to all items, thus scored 0. These candidates had inadequate knowledge of the tested topics. The following is the analysis of candidates' responses in each of the items.

Item (i) *Which component of the nervous system receives impulses from receptors?*

A	*Response*	*B*	*Effector*	*C*	*Relay*
D	*Motor*	*E*	*Coordinator*		

The correct response for this item was alternative *E, Coordinator.* The candidates who chose the correct response were aware that coordinator is an organ (brain and spinal cord) that receives and interprets messages from the receptors. The candidates who chose *A, response* were not aware that, response is any change shown by the organism responding to a stimulus. Those who chose alternative *B, Effector* were not aware that these are cells,

organelles or organs which receive motor impulses from the brain or spinal cord and bring about an appropriate response. Likewise, those who chose *C, Relay* and *D, Motor* did not understand that relay neurone facilitate transmission of nerve impulses between neurones in the central nervous system, while motor neurone transmits nerve impulses from central nervous system to effectors, such as muscles and glands.

Item (ii) *Which of the following is the proper method for disposing plastic bottles?*

A	*Landfill*	*B*	*Incineration*	*C*	*Burying*
D	*Recycling*	*E*	*Pit latrine*		

The correct response for this item was alternative *D Recycling.* The candidates who chose the correct response were familiar with proper ways of disposing wastes. Those who chose *A, landfill, C Burying* and *E, Pit latrine* failed to understand that landfill and pit latrine are forms of burying method of waste disposal. A pit latrine consists of a wooden or concrete platform with a hole positioned over a deep pit, and it can be used to dispose human faeces while a land fill is a place where solid waste is buried in the ground. Likewise, those who chose alternative *B, Incineration* failed to understand that incineration involves burning of materials completely in an incinerator, and it is used to dispose hazardous clinical wastes.

Item (iii) *An individual who is riding a bicycle can waste a lot of water through sweating. Which of the following organs is responsible for the water loss?*

A	*Stomach*	*B*	*Kidney*	*C*	*Skin*
D	*Liver*	*E*	*Lungs*		

The correct response for this item was alternative *C, Skin.* The candidates who chose the correct response were aware that skin has tiny coiled tubules called sweat glands which secrete and release excess water in form of sweat through the pores to the surface of the skin where it evaporates. Those who chose *A, Stomach* failed to understand that stomach is an organ which stores food temporarily. Similarly, those who chose alternatives *B, Kidney, D, Liver* and *E, Lungs* failed to understand that although these are excretory organs kidney excretes urea and excess water as urine, liver excretes bile

pigment from breakdown of haemoglobin, and lungs excretes carbon dioxide and excess water as water vapour.

Item (iv) *In the cowshed, a red furred cow mates with white furred bull. In F_1 generation all cows were red furred. What does this suggest about fur colour in cow?*

A Incomplete dominance *B Codominance*
C Multiple allelism *D Complete dominance*
E Partial dominance

The correct response for this item was *D, Complete dominance*. The candidates who responded correctly to this item had adequate knowledge about Mendelian inheritance thus, could easily recognize that a red colour was a dominant gene which masked the expression of a white colour, a recessive gene in the F_1 generation. Those who chose *A, Incomplete dominance E, Partial dominance* and *B, Co-dominance* failed to understand that these are non Mendelian inheritance. In incomplete dominance there is no dominant or recessive gene, but both express themselves equally resulting in blending of characters. Also, incomplete dominance is known as partial dominance while in codominance genes from both parents are dominant, and are phenotypically expressed in the offsprings. Those who chose *C, Multiple allelism* did not recognise that is a condition in which a gene exists in more than two allelic forms.

Item (v) *Which of the following parts allow water to enter into the seed before germination?*

A Testa *B Plumule* *C Radicle*
D Cotyledon *E Micropyle*

The correct response for this item was *E, Micropyle.* The candidates who chose correct response had adequate knowledge about growth in flowering plants, thus identified micropyle as a small opening found in seeds responsible for absorption of water. However, other candidates chose alternative *A, Testa*, and *D, Cotyledons.* They failed to understand that testa is a hard protective outer layer surrounding the seeds, while cotyledon is a part which store food to support germination. Moreover, those who chose alternative *B, Plumule* and *C, Radicle* failed to understand that these are parts of the embryo where radical develops into a root, and a plumule develops into a shoot in seed germination.

Item (vi) *In natural selection, which type of characteristics are affected?*

A	*Inherited*	*B*	*Acquired*	*C*	*Survived*
D	*Dominant*	*E*	*Recessive*		

The correct response for this item was *A, Inherited*. The candidates who chose the correct response had adequate knowledge about Darwin's theory of evolution, thus understood that inherited characteristics are affected by natural selection. Those who chose *B, Acquired* failed to understand that acquired characteristics are developed in the organism in response to their behaviour in the environment. Similarly, those who chose *C, survived* did not realize that survived characteristics are the characteristics that increase the organism's survival in the environment, and are not inherited. Furthermore, those who chose alternative *D, Dominant* and *E, Recessive* failed to recognize that dominant describes a characteristic or a gene that masks the expression of the other gene, while recessive describes the characteristic or a gene that does not express itself when a dominant gene is present.

Item (vii*) Which process allows absorption of water and mineral salts from the soil in plants?*

A	*Diffusion*	*B*	*Osmosis*	*C*	*Irritability*
D	*Mass flow*	*E*	*Regulation*		

The correct response for this item was *B, Osmosis.* The candidates who chose the correct response were familiar with the process of osmosis. They understood that water and mineral salts move from the soil into the root hair cell through semi-permeable membrane by osmosis. Those who selected *A, Diffusion,* and *D, Mass flow* failed to understand that diffusion involves movement of particles from an area of high concentration to the area of low concentration while mass flow involves bulk movement of substances from one region to another due to the difference in pressure between the two regions. Similarly, those who chose alternative *C, Irritability,* and *E, Regulation* failed to understand that irritability is the ability of living organism to detect and respond to changes in their environment, while regulation is a dynamic process that constantly monitors body systems to detect changes, and provides the mechanism that reacts to internal and external changes to restore stability.

Item (viii) *Why spiders and scorpions are placed in the same class?*

A *They have three pairs of legs*
B *They have a pair of wings*
C *They have a pair of chelicera*
D *They have three body parts*
E *They have two pairs of antennae*

The correct response for this item was *C, They have a pair of chelicera*. The candidates who chose the correct response had clear understanding of the features of members in the Class Arachnida. Those who chose *A, They have three pairs of legs, B, They have a pair of wings* and *D, They have three body parts* failed to understand that these are characteristics of members in Class Insecta. Those who chose alternative *E, They have two pairs of antennae* failed to understand this is a characteristic of members in the Class Crustacea.

Item (ix) *Straightening and bending of the arm involves contraction of the biceps and triceps muscles. Which of the following alternatives describes the state of muscles when human arm is bent?*

A *Biceps muscles contract while triceps relax*
B *Triceps muscles contract while biceps relax*
C *Both biceps and triceps muscles relax*
D *Biceps muscles relax while triceps contract*
E *Both biceps and triceps muscles contracts*

The correct response for this item was alternative *A, Biceps muscles contract while triceps relax.* The candidates who selected the correct response realised that biceps and triceps muscles are muscles found in the upper arm which work antagonistically in that when one contracts the other one relaxes. Therefore, they realize that straightening and bending of the arm involve contraction of the biceps and relaxation of triceps muscles. Those who chose *B, Triceps muscles contract while biceps muscles relax* and *D, Biceps muscles relax while triceps contract* were not aware that when the arm is bent, biceps has to contract and at the same time triceps has to relax. Likewise, those who chose alternative *C, Both biceps and triceps muscles relax* and *E, Both biceps and triceps muscles contracts* failed to understand that these muscles work in pair antagonistically, that is

opposing to each other. Therefore both cannot contract or relax at the same time.

Item (x) *Which features are found in both plant and animal cells?*

A *Chloroplast, cell wall and cell membrane*
B *Cell membrane, nucleus and cytoplasm*
C *Vacuole, cell membrane and cell wall*
D *Cell wall, chloroplast and vacuole*
E *Chloroplast, nucleus and cell wall*

The correct response for this item was *B, Cell membrane, nucleus and cytoplasm.* The candidates who responded correctly to this item had adequate knowledge about the concept of the cell. They realized that cell membrane, nucleus, and cytoplasm are parts found in both plant and animal cells. Those who chose *A, Chloroplast, cell wall and cell membrane, C, Vacuole, cell membrane and cell wall, D, Cell wall, chloroplast and vacuole* and *E, Chloroplast, nucleus and cell wall* failed to understand that although vacuole is found in both plant and animal cells, chloroplast and cell wall are features found only in plant cells.

2.1.2 Question 2: Matching items

The question comprised five matching items which required the candidates to match the uses of apparatuses in **List A** with their corresponding apparatuses in **List B** by writing the letter of the correct response beside the item number in the answer booklet provided.

List A		*List B*	
(i)	*An apparatus used for heating substances in the laboratory.*	*A*	*Bunsen burner*
		B	*Aquarium*
(ii)	*An apparatus used for storing test tube so that they do not roll or break.*	*C*	*Measuring cylinder*
		D	*Hand lens*
(iii)	*An apparatus used for measuring volume of liquids.*	*E*	*Spatula*
		F	*Test tube rack*
(iv)	*An apparatus used to magnify specimens.*	*G*	*Filter funnel*
		H	*Test tube holder.*
(v)	*An apparatus used for keeping live aquatic animals in the laboratory.*		

The question was attempted by 521,963 (100%) candidates. Analysis shows that 77,250 (14.79%) scored from 0 to 1 marks out of whom 33,171 (6.36%) scored 0 out of 5 marks allocated to this question. The candidates who scored from 2 to 3 marks were 116,588 (22.35%), whereas 328,125 (62.86%) scored from 4 to 5 marks. Figure 2 summarizes the candidates' performance in question 2.

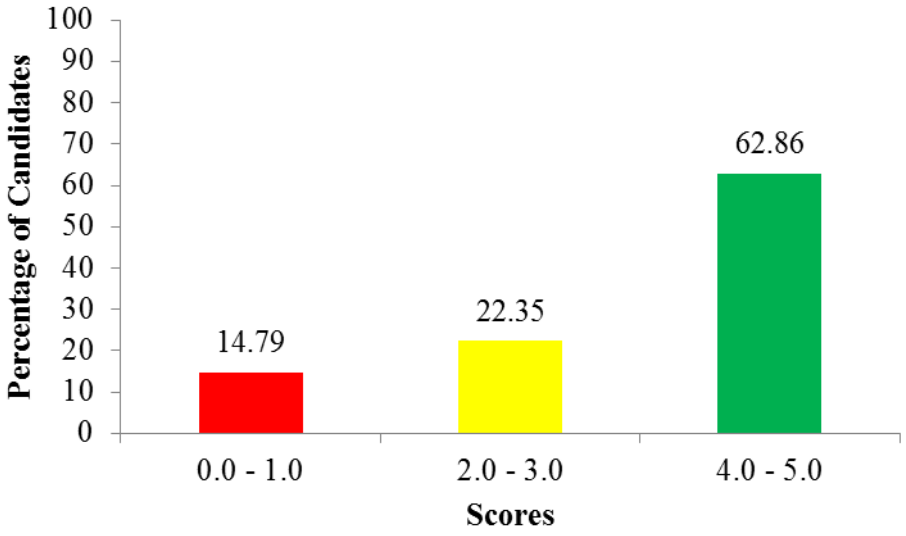
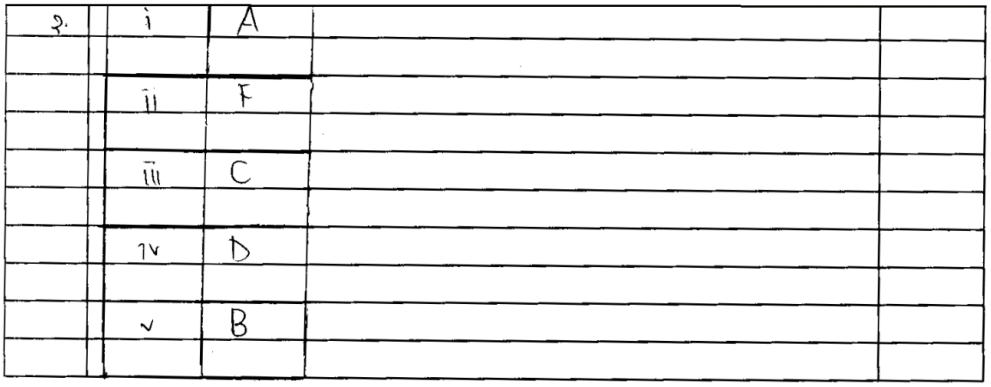


Figure 2: *Candidates' Performance in Question 2*

Figure 2 shows that the general performance of candidates on this question was good as 85.20 per cent scored from 2 to 5 marks. Further analysis shows that 221,717 (42.48%) candidates scored all the 5 marks in this question. This score shows that the candidates had sufficient knowledge of the tested concepts. Extract 1.1 is a sample of the candidate's correct responses to question 2.



Extract 1.1: Candidate's correct response to question 2

In Extract 1.1, the candidate matched all the items correctly, thus scored all the 5 marks allocated to this question.

Further analysis shows that some of the candidates had average performance (2 - 3 marks). This was attributed to candidates' inadequate knowledge about the laboratory apparatus. The candidates were able to match only some of the items hence could not score full marks.

Conversely, candidates who scored low marks (0 - 1) either gave incorrect responses to all the items or gave correct response to only one item, hence loss of marks. This indicates that candidates lacked or had insufficient knowledge of laboratory apparatuses and their uses. The analysis of the candidates' responses in each item is presented in the following:

Item (i) required the candidates to select a response which correctly matches the description of an apparatus used for heating substance in the laboratory. The correct answer was *A, Bunsen burner.* Most of the candidates matched it correctly, indicating that they were aware of laboratory apparatuses and their uses. However, few candidates matched

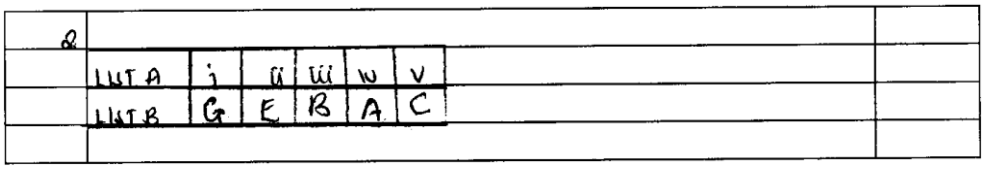
with *H, Test tube holder*. The candidates failed to understand that test tube holder is used to hold test tube during heating, and not used to heat substances.

Item (ii) required the candidates to select a response which correctly matches the description of an apparatus used for storing test tubes so that they do not roll or break. The correct answer was *F, Test tube rack.* Most of the candidates matched it correctly. However, some of the candidates matched with *B, Aquarium*. These candidates failed to understand that aquarium is used to keep live aquatic animals in the laboratory, and not used for keeping test tubes.

Item (iii) required the candidates to select a response which correctly matches the description of an apparatus used for measuring volume of liquids. The correct answer was *C, measuring cylinder.* Most of the candidates matched it correctly, indicating that they have adequate knowledge about laboratory apparatuses and their uses. However, some of them matched with *E, Spatula*. These candidates failed to understand that, spatula is used for scooping solids or crystalline substance in the laboratory, and not for measuring volume of liquid.

Item (iv) required the candidates to select a response which correctly matches the description of an apparatus used to magnify specimens. The correct answer was *D, Hand lens.* Most of the candidates matched it correctly indicating that they had adequate knowledge about laboratory apparatuses and their uses. Conversely, few candidates matched it with *G, Filter funnel.* These candidates failed to understand that filter funnel is used for separation of solid substances from liquids, and not for magnifying specimens.

Item (v) required the candidates to select a response which correctly matches the description of an apparatus used for keeping live aquatic animals in the laboratory. However, some of the candidates matched it with *D,* hand lens. These candidates failed to understand that hand lens is used to magnify specimens and not for keeping live aquatic animals in the laboratory. Extract 1.2 is a sample of the candidate's incorrect responses to question 2.



Extract 1.2: Candidate's incorrect responses to question 2

In extract 1.2, the candidate responded incorrectly to all the items of the question.

2.2 SECTION B: Short Answer Questions

This section consisted of 10 short answer questions. The candidates were instructed to answer all questions in this section. The analysis of each question is as follows:

2.2.1 Question 3: Movement

In this question, candidates were given a statement: "Animals cannot survive without moving from one place to another." They were required to justify the statement by giving three points with one example in each.

This question was attempted by 521,963 (100%) candidates. Among these, 258,660 (49.56%) candidates scored from 0 to 1.5 marks out of whom, 187,866 (35.99%) scored 0 in this question. Candidates who scored from 2 to 3.5 marks were 109,845 (21.04%), whereas 153,458 (29.40%) scored from 4 to 6 marks. Further analysis shows that 23,351 (4.47%) candidates scored all the 6 marks. Figure 3 summarizes the candidates' performance in question 3.

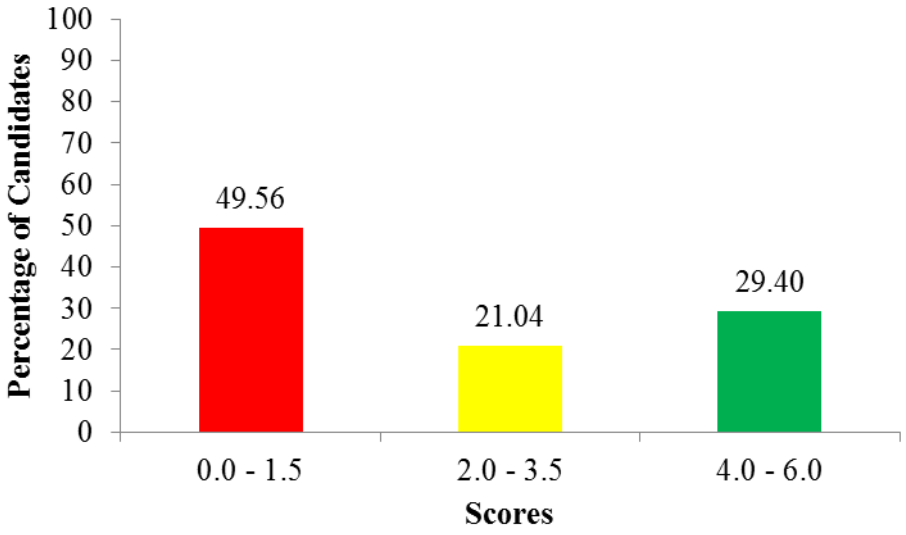
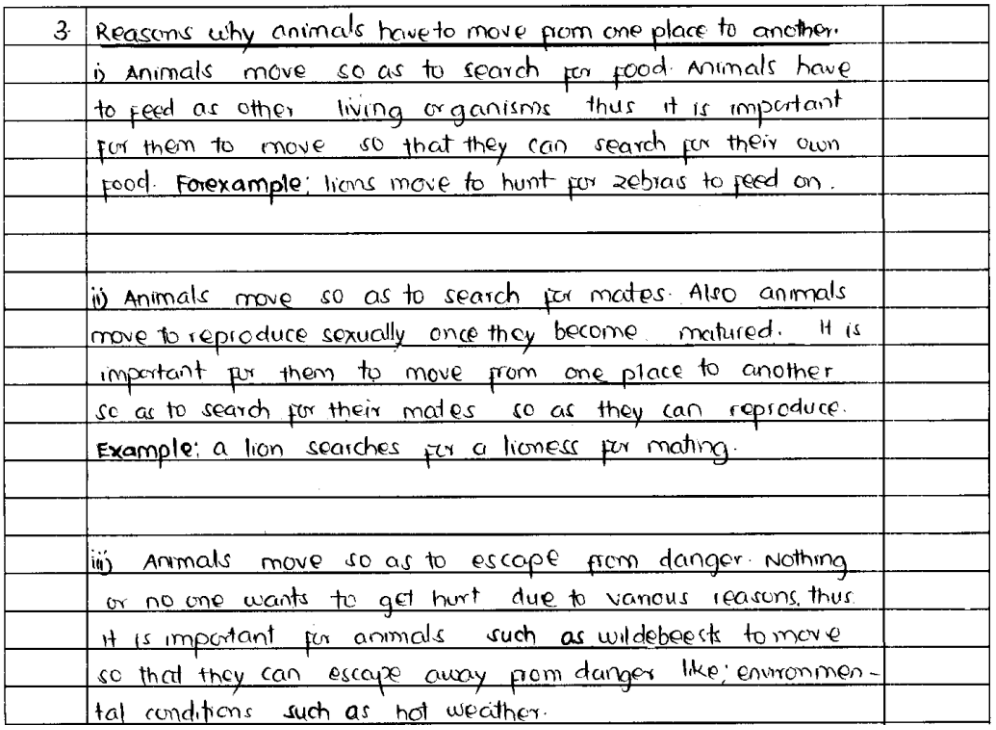


Figure 3: *Candidates' Performance in Question 3*

As Figure 3 demonstrates, the general performance on this question was average because 50.44 per cent of the candidates scored from 2 to 6 marks out of the 6 marks allocated to this question. The candidates who scored high marks (4 - 6) understood the concept of movement and locomotion. Thus, they correctly gave justification of the statement that animals cannot survive without moving from one point to another, and provided an example for each point. Extract 2.1 is a sample of the candidate's correct responses.



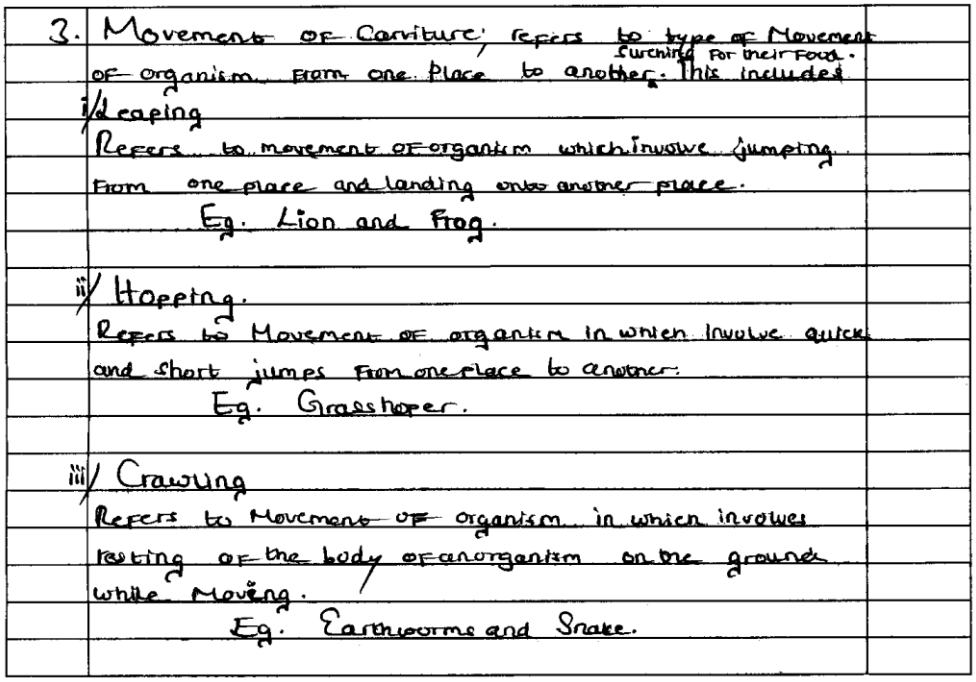
Extract 2.1: Candidate's correct responses to question 3

In Extract 2.1, the candidate correctly justified the statement that "animals cannot survive without moving from one place to another.'' He/she correctly gave an example for each point.

The candidates who scored average marks (2 - 3.5) provided one to two correct points and gave one correct example or none. Therefore, they could not score full marks.

Despite the average performance on this question, 258,660 (49.56%) candidates scored 0 - 1.5 marks. These candidates either did not understand the demands of the question or they lacked knowledge of the tested concepts, thus provided incorrect responses. For those who scored 0 marks, some of them explained the function of skeleton as *skeleton provides support to the body, protects internal delicate organs such as heart and lungs* and *it provides attachment for muscles*. Other candidates listed the parts of the appendicular skeleton, for example *radius, ulna, femur, tibia, fibula, tarsus* and *phalanges.* Others explained the types of movement and gave examples of organisms which exhibit such type of movement as *amoeboid movement example amoeba, muscular movement example human*

being and *ciliary movement example paramecium*. There were also some candidates who drew the human skeleton and labelled it instead of giving justification of the statement that "animals cannot survive without moving from one place to another.'' Such responses show that the candidates lacked enough understanding of the tested concept. Extract 2.2 is a sample of the candidate's incorrect responses.


3. Movement of Carviture, refers to type of Movement of organism from one place to another. This includes
i) Leaping
Refers to movement of organism which involve jumping from one place and landing onto another place.
Eg. Lion and Frog.
ii) Hopping.
Refers to Movement of organism in which involve quick and short jumps from one place to another.
Eg. Grasshoper.
iii) Crawling
Refers to Movement of organism in which involves resting of the body of an organism on the ground while Moving.
Eg. Earthworms and Snake.

Extract 2.2: Candidate's incorrect responses to question 3

In Extract 2.2, the candidate explained different forms of movement in animals such as *leaping* and *hopping* instead of justifying the importance of movement to living organisms.

2.2.2 Question 4: Safety in Our Environment

In this question, candidates were given a statement ''Mr. Shamba got a car accident and was badly injured. During the First Aid process Mr. Sai put on gloves, took a cotton wool and gave him painkillers.'' They were required to state the use of: (a) Gloves (b) Cotton wool (c) Pain killer

The question was attempted by 521,963 (100%) candidates. Analysis shows that 157,515 (30.18 %) candidates scored from 0 to 1.5 marks. Among these, 157,307 (30.14%) scored 0 in this question. The candidates who

scored from 2 to 3.5 marks were 78,538 (15.04%) and 285,910 (54.78%) scored from 4 to 6 marks. Further analysis shows that 174,266 (33.39%) candidates scored 6 marks in this question, as shown in Figure 4.

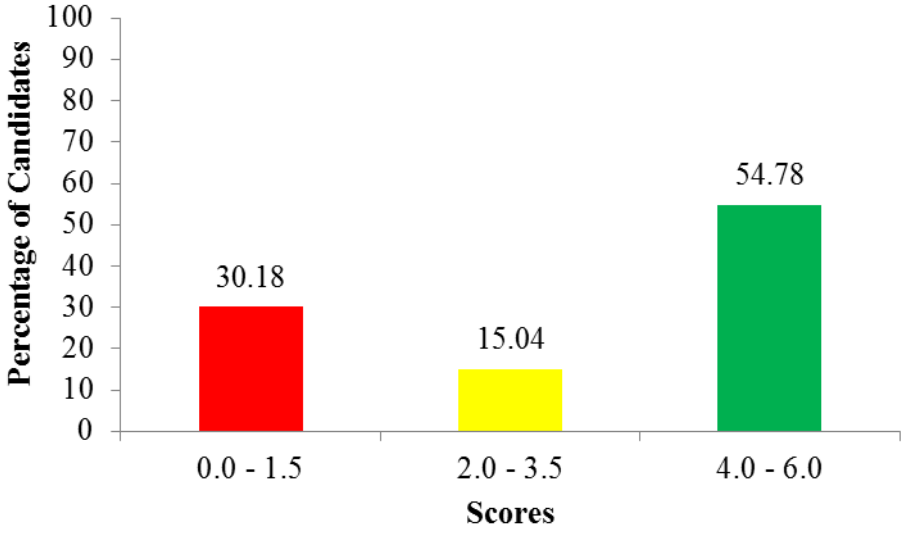
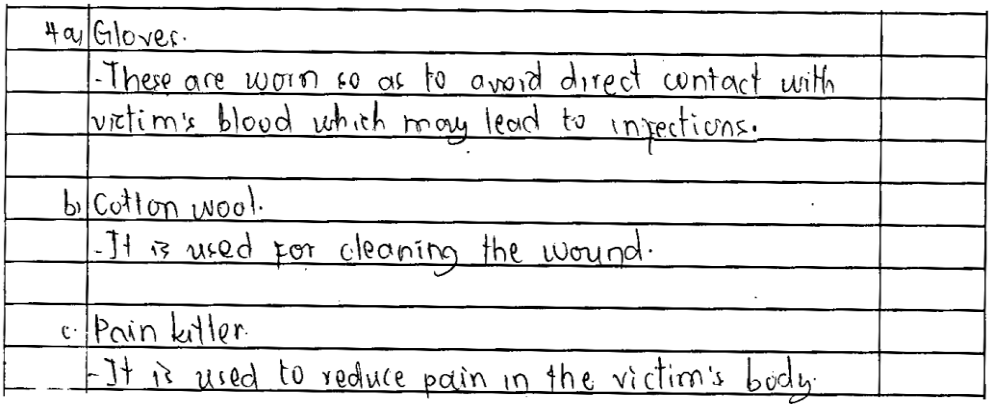


Figure 4: *Candidates' Performance in Question 4*

Figure 4 indicates that, the performance of candidates on this question was good because 69.82 per cent of the candidates scored from 2 to 6 marks out of 6 marks allocated to this question. The candidates who scored high marks (4 - 6) had adequate knowledge of the components of First Aid Kit and their uses. Therefore, they stated the use of gloves, cotton wool and pain killer correctly. Extract 3.1 is a sample of the candidate's correct responses.


4 a) Gloves.
- These are worn so as to avoid direct contact with victim's blood which may lead to injections.

b) Cotton wool.
- It is used for cleaning the wound.

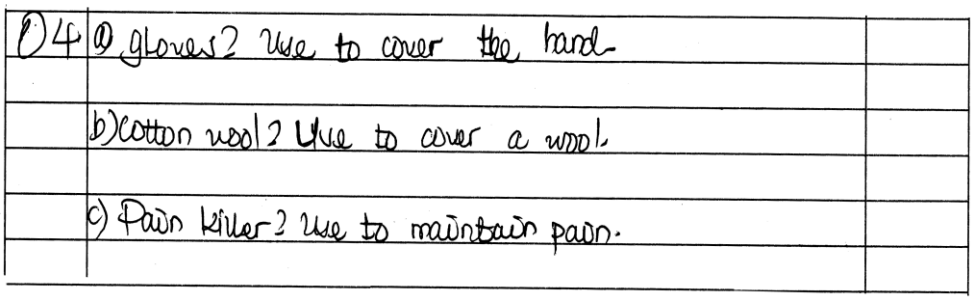
c) Pain killer.
- It is used to reduce pain in the victim's body.

Extract 3.1: Candidate's correct responses to question 4

In Extract 3.1, the candidate correctly stated the use of gloves, cotton wool and pain killers.

The candidates who scored average marks (2 - 3.5) obtained most of the marks in parts (b) and (c). However, in part (a), they wrote incorrect use hence, lost the marks.

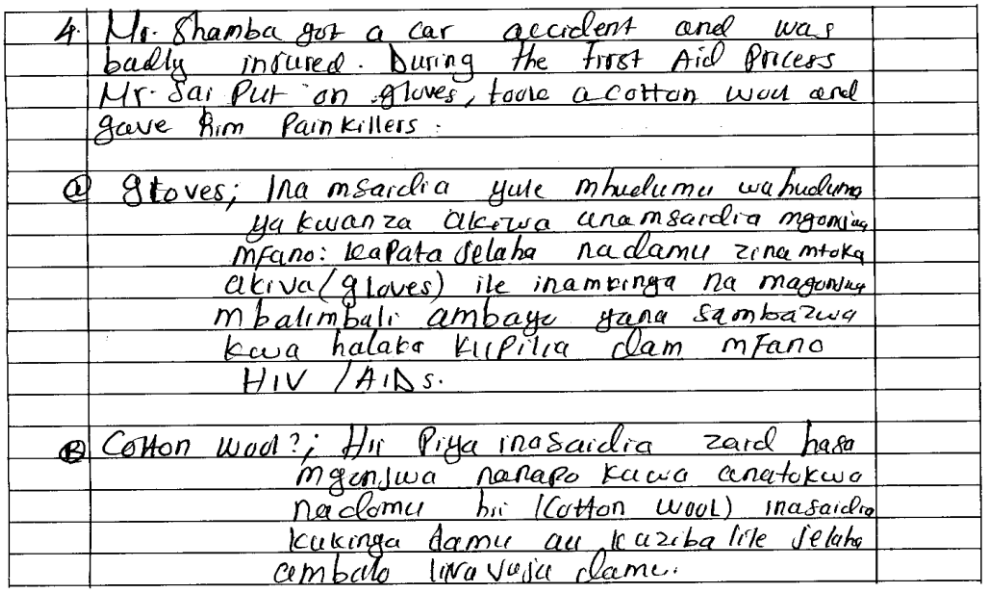
On the other hand, the candidates who scored low marks (0 - 1.5) either did not understand the demand of the question or lacked knowledge about the uses of First Aid Kit components. As a result, they provided incorrect responses. Most of the candidates interchanged the uses of First Aid Kit components. For example, some of the candidates wrote the use of gloves as *used for cutting dressing materials* while others wrote *it is used for securing fractures* in part (a). They failed to realize that gloves are used to prevent direct contact with body fluids of the victim/ protection against infectious organisms or infection. Also, in part (b), some candidates wrote cotton wool *is used for treatment of burns and a scald* while others wrote is *used to reduce muscle cramps.* Likewise, in part (c), some candidates wrote painkiller as *medicine used to treat various diseases such as malaria* while others wrote *used as an antiseptic to clean wounds*. There were also other candidates who wrote the importance of First Aid such as *it saves life, brings hope* and *encourages the victim* and *removes fear of death* instead of stating the uses of gloves, cotton wool and pain killers during provision of First Aid. Moreover, others wrote how to provide First Aid to a car accident victim, as such, they explained the procedures of rendering first aid like *take the victim to a safe place, calm down the victim, let the victim lie down while his/her legs raised* and *reassure and comfort the casualty.* The candidates' responses indicate that they had insufficient knowledge about the uses of the First Aid components. Extract 3.2 (a) is a sample of incorrect responses from one of the candidates.



Extract 3.2 (a): Candidate's incorrect responses to question 4

In Extract 3.2 (a), the candidate incorrectly stated the use of the components of First Aid Kit. For example, he/she wrote *used to maintain pain* instead of reducing pain in part (c). Also the uses given in parts (a) and (b) were incorrect.

Further analysis of the candidates' responses reveals that some of the candidates had poor mastery of the English language as they used the Kiswahili language contrary to the language of instruction, hence obtained low marks. Extract 3.2 (b) is a response from a candidate who used Kiswahili in responding to question 4.


4. Mr. Shamba got a car accident and was badly injured. During the first Aid Process Mr. Sai Put on gloves, took a cotton wool and gave him Painkillers.

(a) Gloves; Ina msaidia yule mhudumu wa huduma ya kwanza akivwa ana msaidia ngonjwa mfano: kapata jeraha na damu zina mtoka akiva (gloves) ile inamkinga na magonjwa mbalimbali ambaye yana sambazwa kwa halaka kupitia dam mfano HIV / AIDs.

(b) Cotton Wool?; Hii Piya inasaidia zaid hasa mgonjwa nanapo kuwa anatokwa na damu hii (Cotton Wool) inasaidia kukinga damu au kuzuiba lile jeraha ambalo liko vujia damu.

Extract 3.2 (b): Candidate's incorrect responses to question 4

In Extract 3.2 (b), the candidate used Kiswahili in responding to the question. He/she correctly wrote *inamkinga mhudumu wa huduma ya kwanza na magonjwa mbalimbali* (prevent the first aider against various diseases). However, the candidate lost marks due to the use of Kiswahili language which was not the language of instruction.

2.2.3 Question 5: Excretion

In this question, the candidates were required to explain four adaptations of the human urinary system to its roles effectively.

The question was attempted by 521,963 (100%) candidates. Analysis indicates that 437,603 (83.84%) candidates scored from 0 to 1.5 marks. Out

of whom, 405,986 (77.78%) scored 0 in this question. Candidates who scored from 2 to 3.5 marks were 27,374 (5.24%) whereas 56,986 (10.92%) scored from 4 to 6 marks. Further analysis reveals that 29,981 (5.74%) scored all the 6 marks. Figure 5 summarizes the candidates' performance in question 5.

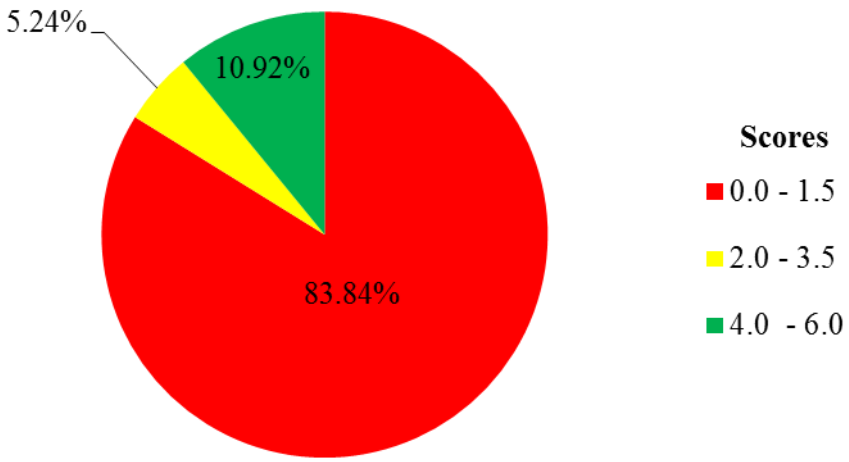
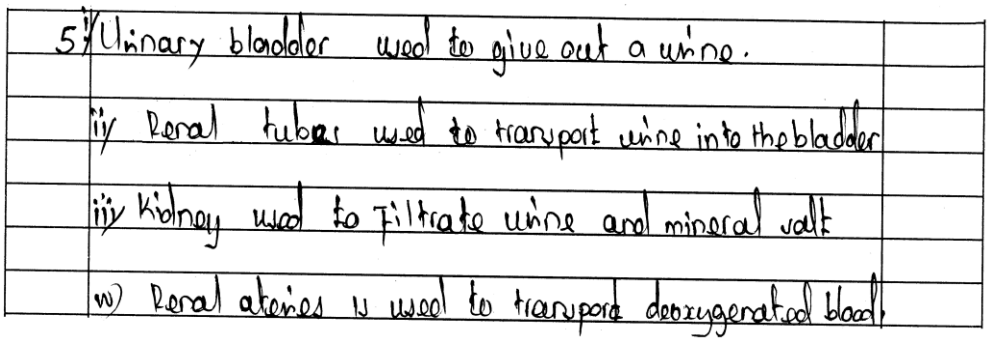


Figure 5: *Candidates' Performance in Question 5*

Figure 5 shows that, candidates' performance on question 5 was weak because 83.84 per cent scored low marks (0 - 1.5). Those candidates who scored 1.5 marks gave one correct point about the adaptation of the urinary system. The candidates who scored zero marks were incompetent about the structure of human urinary system. Some of the candidates wrote the importance of urinary system. For instance, one candidate wrote *eliminating metabolic waste products, maintains the correct concentration of water and salts in the body fluids, control blood pressure* and *control blood composition* instead of explaining the adaptations of the urinary system. Other candidates explained the stages of urine formation as *ultra-filtration in the Bowman's capsule, selective reabsorption* and *removal of materials* as adaptations of urinary system. Also there were other candidates who wrote the parts of the urinary system such as *it has kidney, it has ureter, it has urinary bladder* and *it has renal vein* without explaining how they function to make the urinary system work effectively. Other candidates did not understand the demand of the question, as a result, drew the labelled diagrams of the external and internal structures of the kidney

while others drew the human urinary system. These responses imply that the candidates had inadequate knowledge about the human urinary system. Extract 4.1 is a sample of the candidate's incorrect responses.

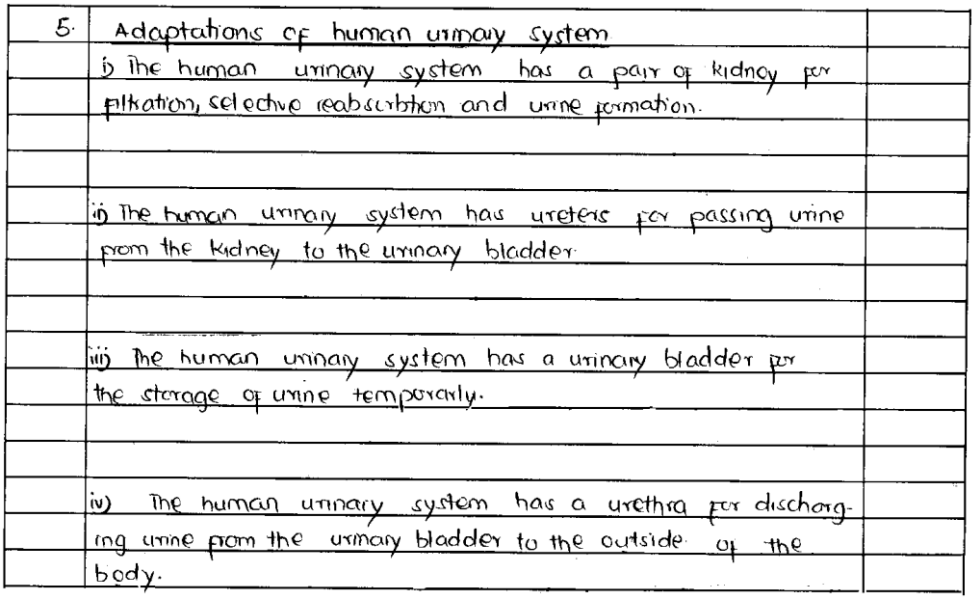

5 i) Urinary bladder used to give out a urine.
ii) Renal tubes used to transport urine into the bladder
iii) Kidney used to filtrate urine and mineral salt
iv) Renal arteries is used to transport deoxygenated blood

Extract 4.1: Candidate's incorrect responses to question 5

In Extract 4.1, the candidate incorrectly wrote the adaptive features of urinary system. For example, he/she wrote *urinary bladder used to give out urine* instead of storing urine temporarily. Also, the other responses given were incorrect.

On the other hand, the candidates who scored average marks (2 - 3.5) gave one to two correct explanations on the adaptation of urinary system to its role, therefore, they lost some marks.

The candidates who scored high marks (4 - 6) were knowledgeable about excretion in human, specifically the urinary system. They were aware of the term adaptation thus, provided correct responses and scored high marks. Extract 4.2 is a sample of the candidate's correct responses.



Extract 4.2: Candidate's correct responses to question 5

In Extract 4.2, the candidate explained correctly adaptations of the human urinary system. He/she was knowledgeable and competent enough about the structure of human urinary system.

2.2.4 Question 6: Health and Immunity

This question had two parts (a) and (b). In part (a), candidates were required to briefly explain three ways through which communicable diseases are transmitted from one person to another. In part (b), candidates were required to give a reason as to why it is healthy advised to boil drinking water.

The question was attempted by 521,963 (100%) candidates. Analysis indicates 283,041 that (54.23%) candidates scored from 0 to 1.5 marks. Out of whom, 175,676 (33.66%) scored 0 in this question. Candidates who scored from 2 to 3.5 marks were 130,866 (25.07%), whereas 108,056 (20.70%) scored from 4 to 6 marks. Further analysis indicates that 48,544 (9.30%) scored all the 6 marks, as shown in Figure 6.

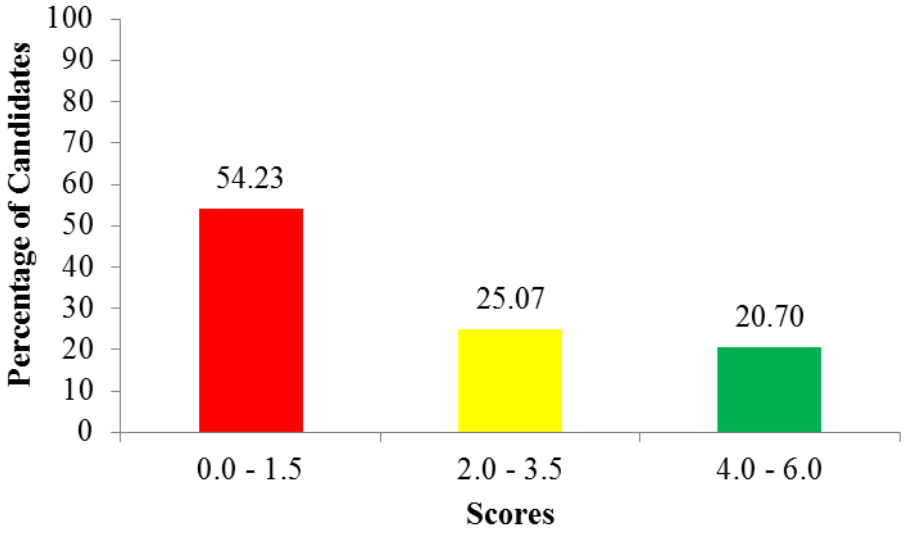
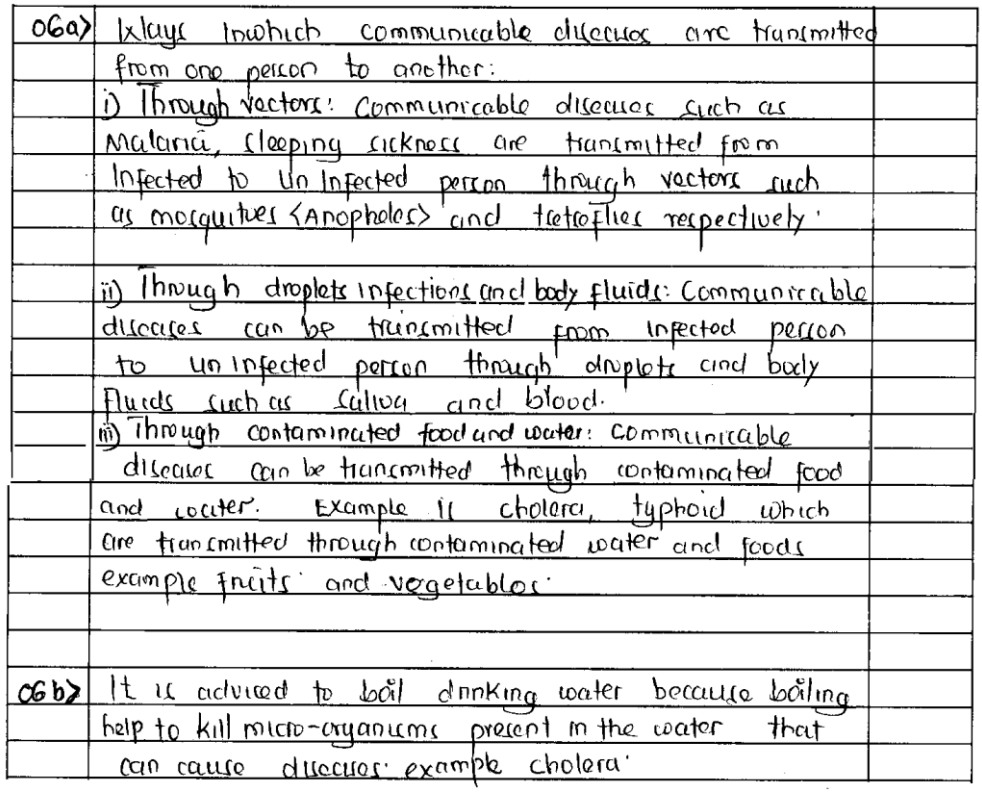


Figure 6: *Candidates' Performance in Question 6*

Figure 6 shows that the general performance on this question was average because 45.77 per cent of the candidates scored from 2 to 6 marks. The candidates who scored high marks (4 - 6) had adequate knowledge of infections and diseases, specifically the ways of transmission of communicable diseases. They were aware that communicable disease among other ways are transmitted *through contact, sexual intercourse, blood transfusion, organ transplant, sharing of sharp objects, during delivery* and *breastfeeding.* Thus, they correctly explained the ways in part (a) and gave a reason for boiling drinking water in part (b). Extract 5.1 is a sample of the candidate's correct responses.



Extract 5.1: Candidate's correct responses to question 6

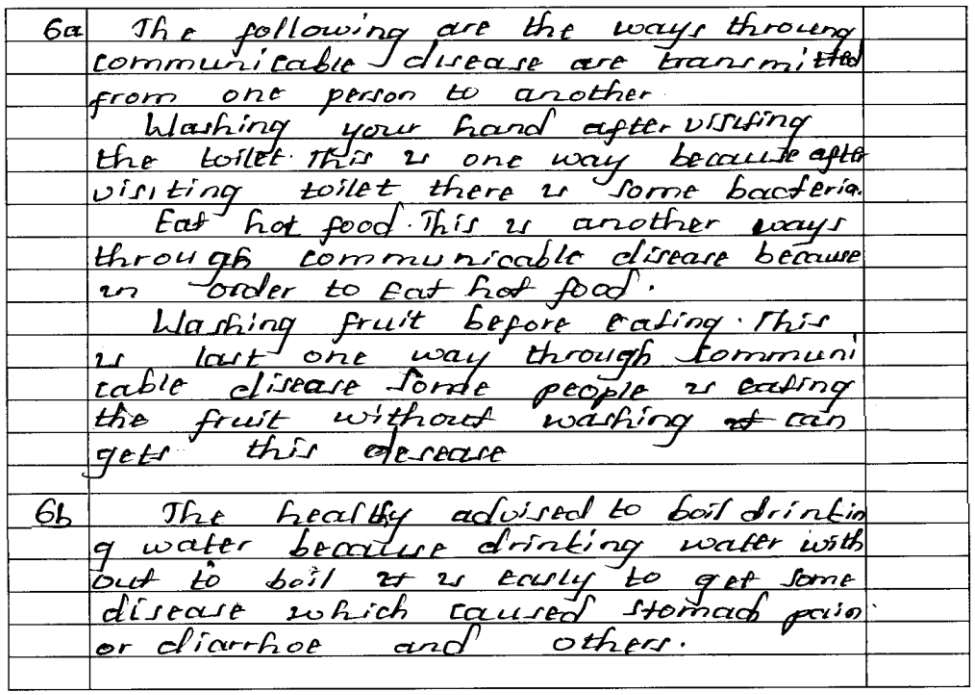
In Extract 5.1, the candidate correctly explained the ways on which communicable diseases are transmitted in part (a). Also, he/she gave a reason for boiling drinking water in part (b).

On the other hand, the candidates who scored average marks (2 - 3.5) obtained most of the marks in part (a) as they gave one to two correct points on the ways in which communicable diseases are transmitted. However, in part (b), they lost marks because they gave partial explanation on why it is healthy advised to boil drinking water.

The candidates who scored low marks (0 - 1.5) gave one correct point on the ways through which diseases are transmitted from one person to another. The candidates who scored zero marks were incompetent about infections and diseases. Most of the candidates gave responses which were contrary to the demand of the question. In part (a), some of candidates mentioned symptoms of communicable diseases. For example, some candidates wrote symptoms of malaria as *pain in joints, abdominal pain*

and *sweating* while others wrote the symptoms of cholera as *vomiting, diarrhoea* and *wrinkled skin*. Other candidates wrote different communicable diseases and the causative agents. For instance, one candidate wrote *cholera is caused by Vibrio cholerae, typhoid is caused by Salmonella typhi* and *malaria is caused by plasmodium.* There were also other candidates who mentioned diseases such as *HIV/AIDS, Cholera* and *malaria*. In this case, the candidates failed to explain the ways in which communicable diseases are transmitted.

Similarly, in part (b), the candidates failed to give a reason as to why it is healthy to boil drinking water. Some of the candidates wrote the functions of water in the body such as *water helps in digestion process, helps in regulation of body temperature* and *helps to maintain the shape of cells, tissues and organs.* Some candidates wrote properties of water such as *water is a universal solvent, it is tasteless* and *colourless* while others wrote ways of maintaining good health such *as keep your body clean, eat balanced diet, have a regular physical exercise* instead of importance of boiling drinking water. Moreover, one candidate wrote that, *it is important to boil water so as to make it soft.* Extract 5.2 is a sample of the candidate's incorrect response.


6a The following are the ways throung communicable disease are transmitted from one person to another
Washing your hand after visiting the toilet. This is one way because after visiting toilet there is some bacteria.
Eat hot food. This is another ways through communicable disease because in order to eat hot food.
Washing fruit before eating. This is last one way through communicable disease some people is eating the fruit without washing it can get this disease

6b The healthy advised to boil drinking water because drinking water without to boil it is easly to get some disease which caused stomach pain or diarrhoe and others.

Extract 5.2: Candidate's incorrect responses to question 6

In Extract 5.2, the candidate explained the ways of preventing the spread of diseases instead of the ways of transmitting of communicable diseases in part (a). He/she explained the effects of drinking unboiled water instead of explaining the importance of boiling drinking water, in part (b).

2.2.5 Question 7: Balance of Nature

In this question, the candidates were required to briefly explain and give an example for each, the terms competition, mutualism and predation.

The question was attempted by 521,963 (100%) candidates. Analysis shows that 435,203 (83.38%) candidates scored from 0 to 1.5 marks, out of whom, 391,357 (74.98%) scored 0 in this question. The candidates who scored from 2 to 3.5 marks were 49,575 (9.50%) while 37,185 (7.12%) scored from 4 to 6 marks. Further analysis shows that 8,095 (1.55%) candidates scored 6 marks in this question. Figure 7 summarizes the candidates' performance in question 7.

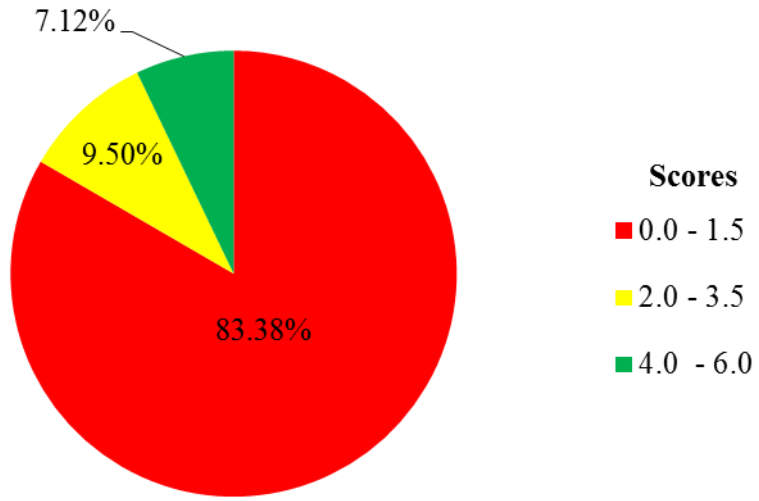


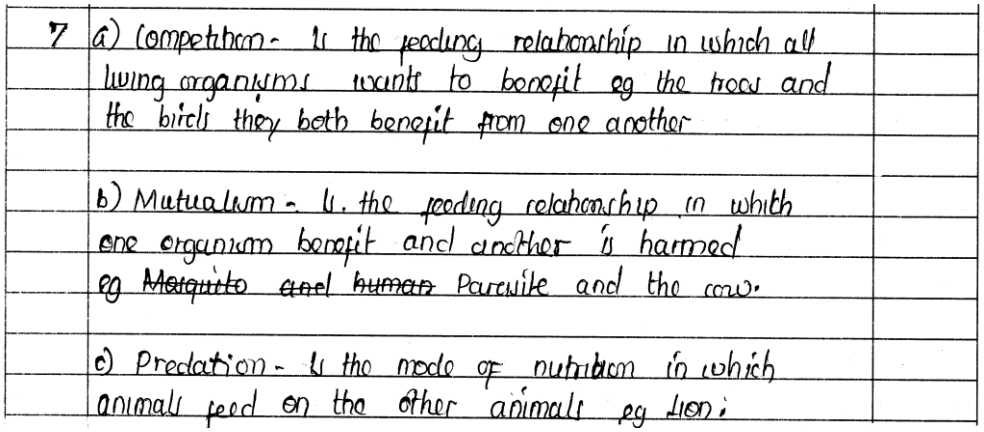
Figure 7: *Candidates' Performance in Question 7*

Figure 7 indicates that the candidates' performance on this question was generally weak since 83.38 per cent scored from 0 to 1.5 marks, out of 6 marks allocated to this question. The candidates who scored low marks (0 - 1.5) gave one correct explanation for one term, and they did not give an example. The candidates who scored zero marks lacked or had partial knowledge about interactions of organisms in the environment, thus provided incorrect responses. In part (a), some of the candidates defined

competition as a social interaction of human without linking it with interdependence of organisms in the ecosystem. For instance, one candidate wrote *it is when a person struggles to win in different activities as football match, marathon or games*. Other candidates wrote incorrect responses such as *competition occurs when organisms lack food, competition is the relationship between organisms.* Others defined the term *competition as group of organisms which feed on the same type of food.* These candidates failed to understand that *competition is a feeding relationship where organisms struggle for the same limited environmental resources for survival. For example, lions and leopards compete for limited zebra*.

In part (b), candidates incorrectly defined the term mutualism. Some of the candidates explained mutualism as commensalism. For instance, one candidate wrote *mutualism is a feeding relationship in which one organism benefits while the other one neither benefit nor harmed.* Also, there were other candidates who defined mutualism as saprophytism. For instance, one candidate wrote *mutualism is the feeding relationship in which organisms feed on dead and decaying organic matter.* They failed to distinguish mutualism from saprophytism. Other candidates wrote *mutualism is a close relationship between two organisms of different species.* Incorrect responses imply that, the candidates had inadequate knowledge about the interactions of organisms in the environment. These candidates were not aware that *Mutualism is the relationship between two organisms in which both benefit from each other. For example bacteria which live in the digestive system of herbivores and produce cellulase enzyme for digestion in turn the bacteria get food and shelter in the ruminants' digestive system*.

Likewise, in part (c) candidates incorrectly explained the term predation. Some of the candidates provided explanation for competition instead of predation. For example, one candidate wrote *predation is a feeding relationship by which two organisms struggle for the same limited resources.* Also, there were other candidates who explained predation *as ability of living organisms to graze*. These candidates were not aware that *predation is the prey and predator feeding relationship where one organism (predator) captures, kills and feeds on another organism (prey). For example cats (predator) eat mice (prey).* Extract 6.1 is a sample of the candidate's incorrect responses.


7 a) Competition - is the feeding relationship in which all living organisms wants to benefit eg the trees and the birds they both benefit from one another

b) Mutualism - is the feeding relationship in which one organism benefit and another is harmed eg ~~Mosquito and human~~ Parasite and the cow.

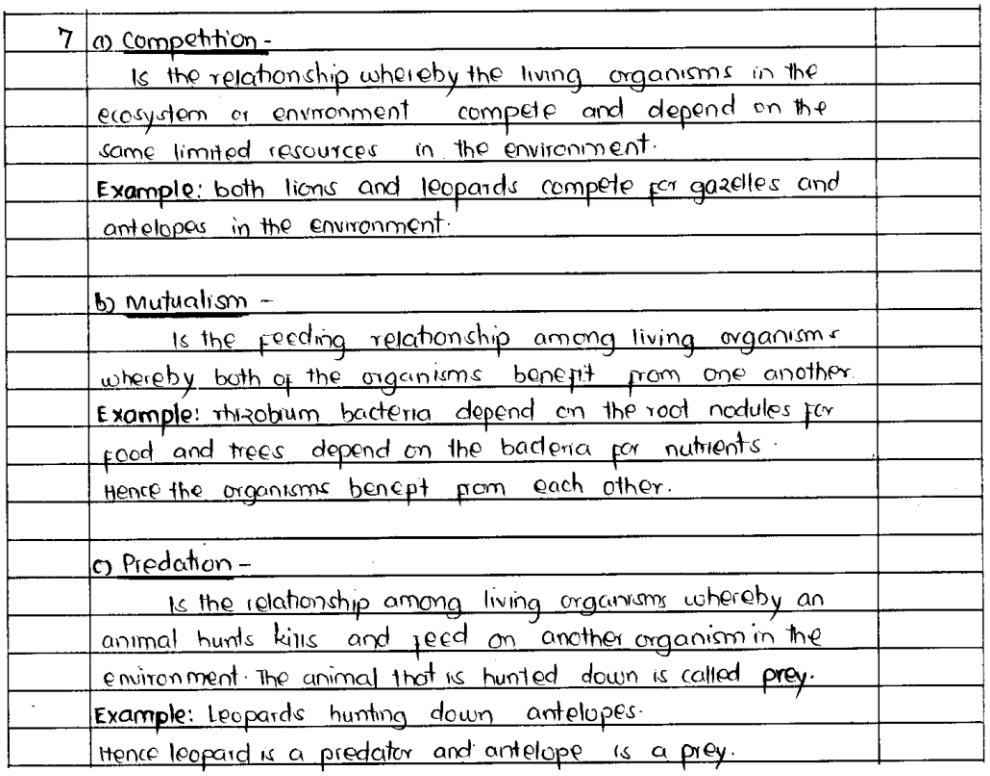
c) Predation - is the mode of nutrition in which animals feed on the other animals eg Lion;

Extract 6.1: Candidate's incorrect responses to question 7

In Extract 6.1, the candidate provided incorrect responses in all parts. For example, he/she explained parasitism instead of mutualism in part (b). Also, the responses given in other parts were incorrect.

On the other hand, the candidates who scored average marks (2 - 3.5) obtained most of the marks in parts (b) and (c), as they correctly explained one to two terms only, hence loss of some marks. However, they failed to give correct explanation in part (a). They gave incorrect examples hence lost some marks.

The candidates who scored high marks (4 - 6) were knowledgeable about interactions of organisms in the environment. Some of them explained correctly all the terms and provided one example in each, hence scored all the 6 marks. Extract 6.2 is a sample of the correct responses from one of the candidates.



Extract 6.2: Candidate's correct responses to question 7

In Extract 6.2, the candidate correctly explained the terms competition, mutualism and predation with correct examples for each.

2.2.6 Question 8: Regulation

This question had two parts, namely (a) and (b). In part (a), the candidates were required to differentiate the term hyperglycaemia from hypoglycaemia. In part (b), they were required to give four symptoms of a person suffering from diabetes mellitus.

The question was attempted by 521,963 (100%) candidates. Analysis shows that 393,076 (75.31%) candidates scored from 0 to 1.5. Out of whom, 273,676 (52.43%) scored 0 in this question. The candidates who scored from 2 to 3.5 were 94,822 (18.16%), whereas 34,065 (6.53%) candidates scored from 4 to 6 marks. Further analysis shows that 5,156 (0.99%) candidates scored all the 6 marks Figure 8 summarizes the candidates' performance in question 8.

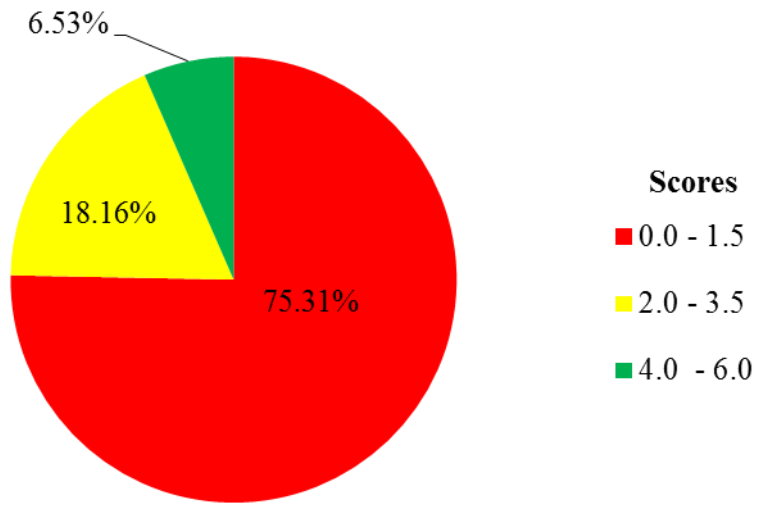
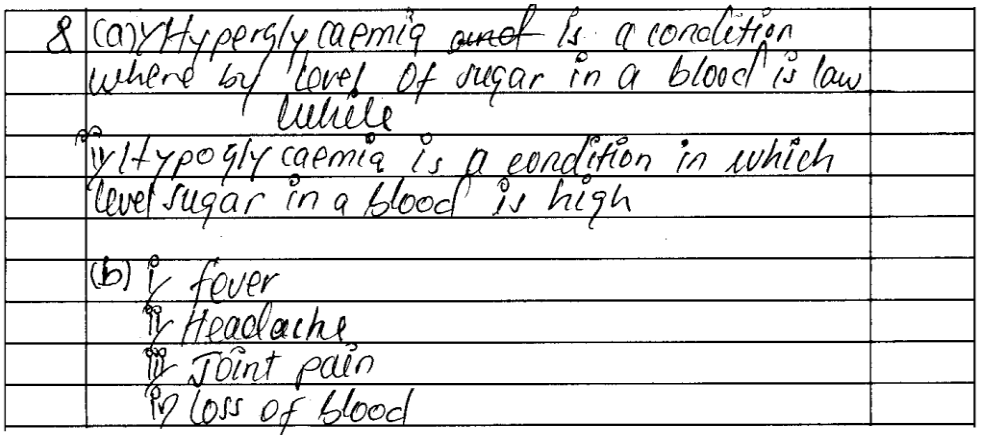


Figure 8: *Candidates' Performance in Question 8*

Figure 8 shows that the candidates' performance on this question was weak because 75.31 per cent of the candidates scored from 0 to 1.5 marks, out of the 6 marks allotted to this question. The candidates who scored low marks (0 - 1.5) had inadequate knowledge of blood sugar regulation in mammals. Most of the candidates provided incorrect responses which made them to score 0 marks. In part (a), some candidates wrote *hyperglycaemia means high body temperature while hypoglycaemia means low body temperature*. Other candidates wrote *hyperglycaemia is high blood pressure while hypoglycaemia is low blood pressure*. Others wrote hyperglycaemia as *high water concentration in the blood while hypoglycaemia as low concentration of water in the blood*. These candidates were not aware that *hyperglycaemia is the condition in which the glucose concentration in the blood is high, while hypoglycaemia is the condition in which glucose concentration in the blood is low*.

In part (b), most of the candidates gave symptoms of communicable diseases instead of diabetes. For example, some candidates gave symptoms of tuberculosis as *frequent coughing, night sweats, blood stained sputum* and *poor appetite.* Others gave symptoms of sexually transmitted diseases as *painful intercourse, itching in the private parts, pain when urinating* and *genital rashes.* Others gave the symptoms of high blood pressure as *nose bleed, chest pain* and *ringing in the ears.* There were also other candidates who gave the symptoms of nutritional deficiency diseases. For example,

some of the candidates outlined the symptoms of kwashiorkor as *skin becomes dry, protruding stomach, thin arms and legs* and *hair becomes soft*. These candidates were not aware of the symptoms of diabetes mellitus which are: *High level of sugar in the blood, presence of sugar in the urine, high frequency of urination, excessive thirst which leads to higher intake of water, wounds take long time to heal, hunger, blurred vision, fatigue, body weight loss, dry mouth and skin, impotence in males, recurrent infections* and *numbness in the fingers*. Extract 7.1 is a sample of the candidate's incorrect responses.


8 (a) Hyperglycaemia ~~and~~ is a condition where by level of sugar in a blood is low while
Hypoglycaemia is a condition in which level sugar in a blood is high

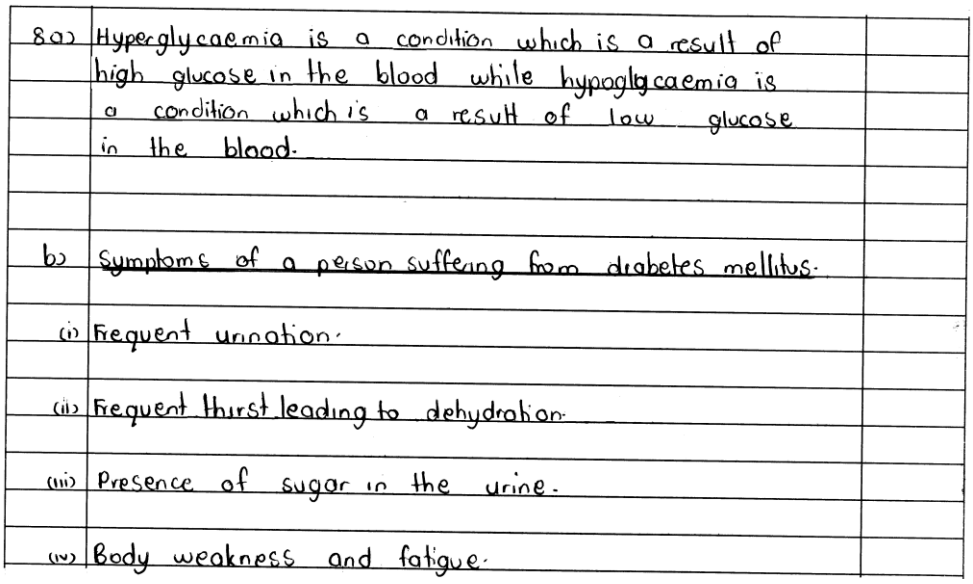
(b) i fever
ii Headache
iii Joint pain
iv loss of blood

Extract 7.1: Candidate's incorrect responses to question 8

In Extract 7.1, the candidate interchanged the answers where he/she wrote explanation of hypoglycaemia in place of hyperglycaemia in part (a). Also, he/she gave symptoms of malaria instead of diabetes mellitus in points (i), (ii) and (iii). Also, the response in (iv) was incorrect.

Majority of the candidates who scored average marks (2 - 3.5) obtained most of the marks in part (b) by mentioning two to three symptoms of diabetes mellitus. However, in part (a), they incorrectly differentiated the terms, hence lost the marks.

The candidates who scored high marks (4 - 6) were knowledgeable about blood sugar regulation in mammals. These candidates correctly differentiated the terms in part (a), and gave four symptoms of a person suffering from diabetes mellitus in part (b). Extract 7.2 is a sample of the correct responses from one of the candidates.



Extract 7.2: Candidate's correct responses to question 8

In Extract 7.2, the candidate correctly differentiated hyperglycaemia from hypoglycaemia in part (a). He/she also gave the correct symptoms of a person suffering from diabetes mellitus.

2.2.7 Question 9: Gaseous Exchange and Respiration

This question had two parts (a) and (b). In part (a), the candidates were required to give reason as to why it is impossible for a locust to die when its head is held under water. In part (b), candidates were required to give reason as to why do people breathe more when they run fast.

This question was attempted by 521,963 (100%) candidates. Analysis indicates that 432,485 (82.86%) candidates cored from 0 to 1.5 marks. Out of whom, 432,138 (82.79%) scored 0 in this question. Candidates who scored from 2 to 3.5 marks were 48,743 (9.34%), whereas 40,735 (7.80%) scored from 4 to 6 marks. Further analysis shows that 11,109 (2.13%) candidates scored all the 6 marks. Figure 9 summarizes the candidates' performance in question 9.

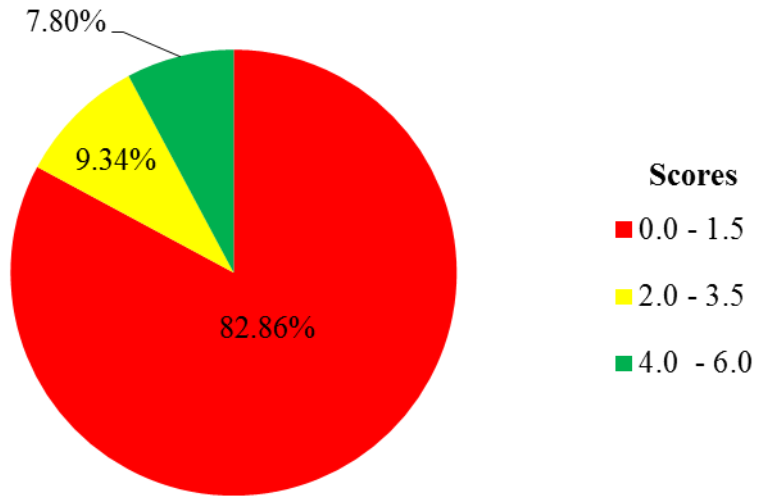
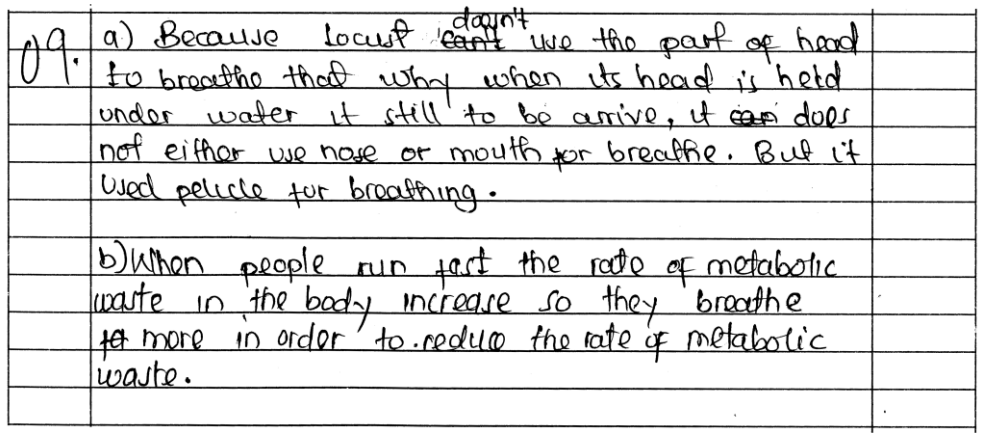


Figure 9: *Candidates' Performance in Question 9*

Figure 9 indicates that the candidates' performance on this question was weak since 82.86 per cent scored from 0 to 1.5 marks, out of 6 marks allocated to this question. The candidates who scored low marks (0 – 1.5) had inadequate knowledge of the concept of gaseous exchange and respiration. The candidates 432,138 (82.79%) who scored 0 lacked knowledge of the location of organs responsible for gaseous exchange in living organisms and importance of respiration, thus provided incorrect responses in all parts. In part (a), some candidates gave reasons such as, *locust will not die because it will fly* and *locust will not die because you will not be able to catch it.* Other candidates wrote, *the locust will not die it will drink water.* Also, there were candidates who wrote that *the locust will die because it will lack oxygen*. The candidates failed to understand that locust has openings called spiracles/gaseous exchange sites located on its abdomen which remain out of water, therefore, cannot die because gaseous exchange will proceed.

Likewise, in part (b), candidates failed to understand the demand of the question. Some candidates wrote the events which take place during gaseous exchange in mammals. For instance, one candidate wrote *during breathing in, diaphragm muscles contracts pulling the diaphragm downward, external intercostal muscles contracts while internal intercostal muscles relax pulling the ribcage upwards and outwards as the result increase in the volume and decrease of air pressure of the thorax this makes air to enter into the lungs through the nostril, trachea, bronchus,*

bronchioles and alveolus. Others explained features of respiratory surfaces such as *because lungs are moist, lungs are branched, because lungs are surrounded by blood capillaries* and *lungs are well ventilated.* Also, there were other candidates who drew a well labelled diagram of mammalian lung while others wrote various respiratory surfaces such as *gills, lungs, book lungs* and *tracheal system* instead of giving a reason as to why do people breathe more when they run fast. Extract 8.1 is a sample of the candidates' incorrect responses.


9. a) Because locust ~~can't~~ doesn't use the part of head to breathe that why when its head is held under water it still to be arrive, it ~~can~~ does not either use nose or mouth for breathe. But it used pellicle for breathing.

b) When people run fast the rate of metabolic waste in the body increase so they breathe ~~fa~~ more in order to reduce the rate of metabolic waste.

Extract 8.1: Candidate's incorrect response to question 9

In Extract 8.1, the candidate wrote incorrect responses in all parts. For example, he/she wrote *locust use pellicle* (a structure which maintains the shape of the cell in protozoans) for breathing, instead of spiracles which are located in the abdomen, in part (a).

Conversely, the candidates who scored average marks (2 - 3.5) obtained most of the marks, in part (b) as they correctly gave reasons as to why do people breathe more when they run fast. However, they failed to give explanation for part (a), hence loss of marks.

The candidates who scored high marks (4 - 6) were knowledgeable about concept of gaseous exchange and respiration. They were able to give reason as to why it is impossible for a locust to die when its head is held under water, in part (a). Also, they gave explanation as to why do people breathe more when they run fast, thus scored all the 6 marks. Extract 8.2 is a sample of the candidates' correct responses.

9.	(a) The locust cannot die because the locust has openings called spiracles located at its abdomen which allow air to enter the tracheal tubes for gaseous exchange so it will continue breathing.	
	(b) People breathe more when they run fast because the body needs energy for running faster and so more oxygen is needed to respire the glucose to produce energy and therefore breathing more provides the lungs with alot of oxygen for respiration.	

Extract 8.2: Candidate's correct response to question 9

In Extract 8.2, the candidate explained the reason why locust will not die while its head is held under water, in part (a). He/she gave a reason to why people breathe more when they run fast, in part (b).

2.2.8 Question 10: Coordination

In this question, candidates were required to briefly explain how nervous system and adrenal gland work together to bring about a response when a person is threatened by a lion.

The question was attempted by 521,963 (100%) candidates. Analysis indicates that 512,943 (98.27%) candidates scored from 0 to 1.5 marks. Out of whom, 488,045 (93.50%) scored 0 in this question. Candidates who scored from 2 to 3.5 marks were 2,987 (0.57%), whereas 6,033 (1.16%) scored from 4 to 6 marks. Further analysis reveals that 4,300 (0.82%) scored all the 6 marks, as shown in Figure 10.

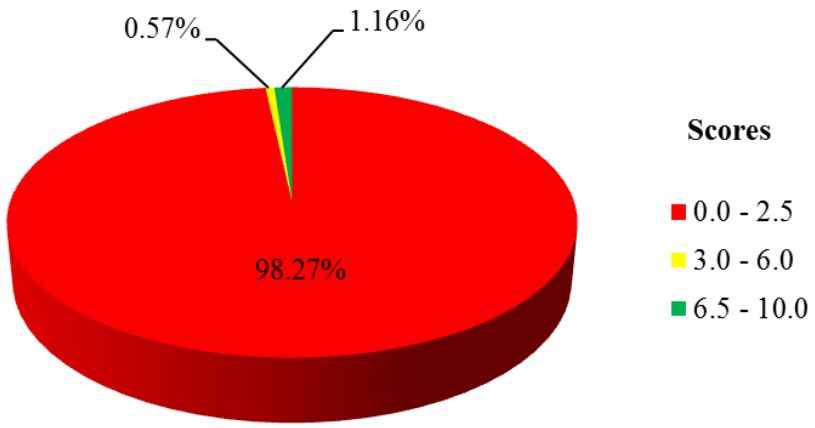
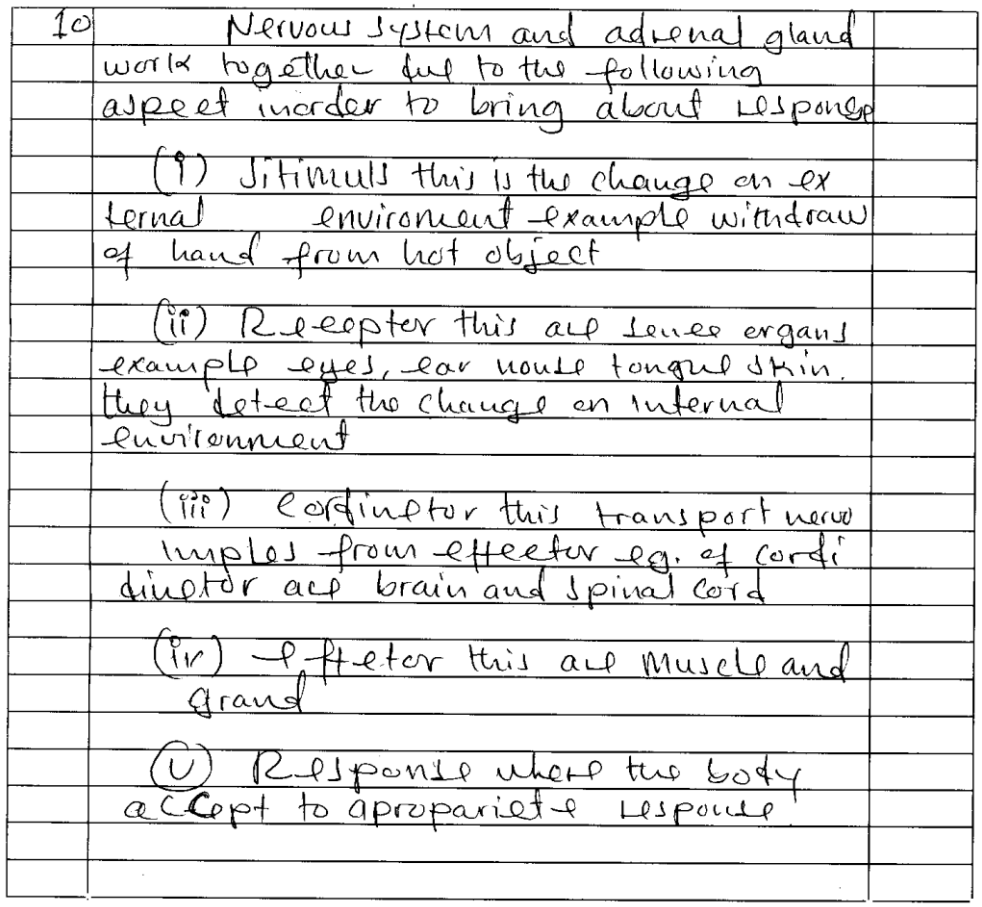


Figure 10: *Candidates' Performance in Question 10*

Figure 10 illustrates that the candidates' general performance on question 10 was weak since 98.27 per cent scored from 0 to 1.5 marks, out of the 6 marks allocated to this question. The candidates who scored low marks (0 - 1.5) had inadequate knowledge about the concept of coordination and endocrine system. The candidates failed to recognise that the impulses occur sequentially from the moment a person was threatened by a lion to the time the response was brought about. However, most of the candidates gave incorrect explanation. Analysis indicates further that some candidates had correct points but mixed the explanation, hence scored low marks. Most of the candidates wrote responses contrary to the demands of the question. Some of them explained the functions of the neurones as; *relay neuron convey nerve impulses within the central nervous system, motor neurone transmit nerve impulses from central nervous system to effector* and *sensory neurone transmit nerve impulse from receptors to the central nervous system*. Others wrote the functions of different hormones as *adrenaline prepares a body to cope with dangerous situations, aldosterone promotes retention of sodium chloride, oxytocin stimulates contraction of the muscles of the uterus at birth* and *anti-diuretic hormones stimulate water reabsorption by the kidney*. Also, other candidates drew a well labelled diagram of the human brain, while others drew the human body and labelled different glands. Furthermore, other candidates explained the differences between nervous system and endocrine system as *in nervous system impulses are transmitted in form of electrical while in endocrine*

system impulses are transmitted inform of chemical. Response is fast in nervous system while in endocrine system it is slow, effects are short lived in nervous system while in endocrine system are long lasting and *impulses are transported by neurones while hormones are transmitted by blood*.

Moreover, some candidates skipped the question, while others explained the function of brain and spinal cord in human being instead of explaining how nervous system and adrenal gland work together to bring about a response when a person is threatened by a lion. Incorrect responses imply that the candidates had inadequate knowledge of the concept of coordination and endocrine system. Extract 9.1 is a sample of the candidates' incorrect responses.


10 Nervous system and adrenal gland work together due to the following aspect inorder to bring about response

(i) Stimuli this is the change on external environment example withdraw of hand from hot object

(ii) Receptor this are senses organs example eyes, ear nose tongue skin. they detect the change on internal environment

(iii) Cordinator this transport nerve imples from effector eg. of cordinator are brain and spinal cord

(iv) effector this are Muscle and grand

(v) Response where the body accept to aproparite response

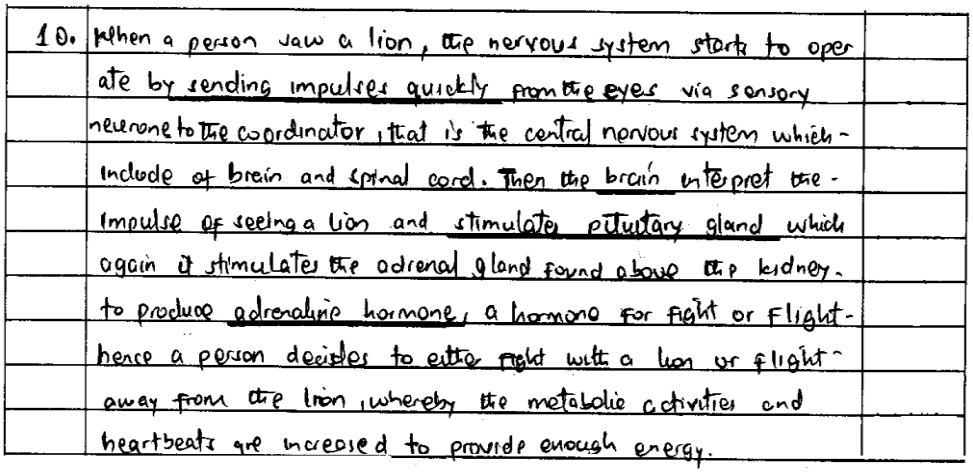
Extract 9.1: Candidate's incorrect response to question 10

In Extract 9.1, the candidate explained components of nervous coordination, instead of explaining how nervous system and adrenal gland

work together to bring about a response when a person is threatened by a lion.

On the other hand, the candidates who scored average marks (2 - 3.5) gave partial responses on how nervous system and adrenal gland work together to bring about a response when a person is threatened by a lion, hence loss of marks.

The candidates who scored high marks (4 - 6) explained correctly how the nervous system and adrenal gland worked together to bring about a response when a person was threatened by a lion, hence scored all the 6 marks. This indicates that the candidates had adequate knowledge of the concept of coordination and endocrine system. Extract 9.2 is a sample of the candidates' correct responses.


10. When a person saw a lion, the nervous system starts to operate by sending impulses quickly from the eyes via sensory neurone to the coordinator, that is the central nervous system which include of brain and spinal cord. Then the brain interpret the impulse of seeing a lion and stimulate pituitary gland which again it stimulates the adrenal gland found above the kidney. to produce adrenaline hormone, a hormone for fight or Flight- hence a person decides to either fight with a lion or flight away from the lion, whereby the metabolic activities and heartbeats are increased to provide enough energy.

Extract 9.2: Candidate's correct responses to question 10

In Extract 9.2, the candidate explained correctly how the nervous system and adrenal gland worked together to bring about a response when a person was threatened by a lion.

2.2.9 Question 11: Transport of Materials in Living Things

In this question, the candidates were required to give three importance of transpiration in plants.

The analysis revealed that 521,963 (100%) candidates responded to this question. Data show that 335,260 (64.23%) scored from 0 to 1.5 marks, out

of whom 334,864 (64.15%) scored 0 marks. The candidates who scored from 2 to 3.5 marks were 95,915 (18.38%), whereas 90,788 (17.39%) scored from 4 to 6 marks. Further analysis reveals that 32,333 (6.19%) candidates scored all the 6 marks. Figure 11 summarizes the candidates' performance in question 11.

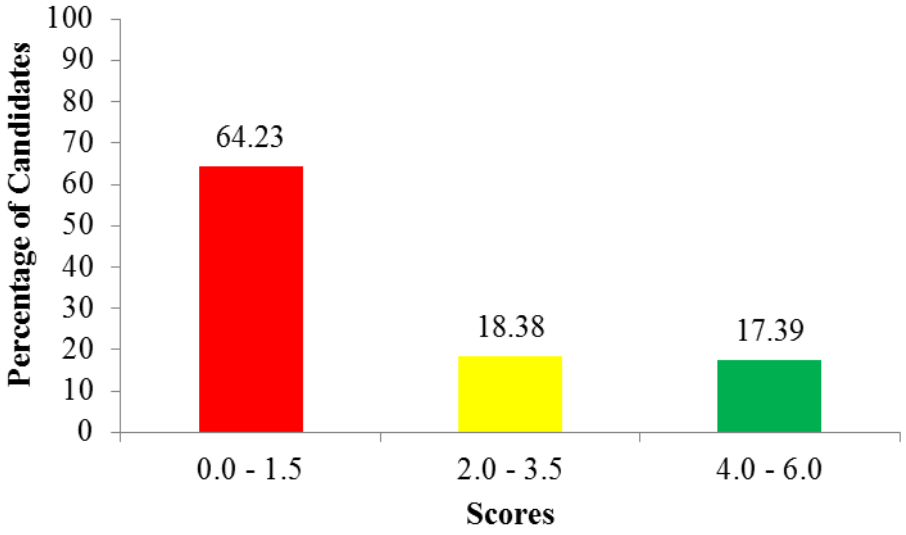
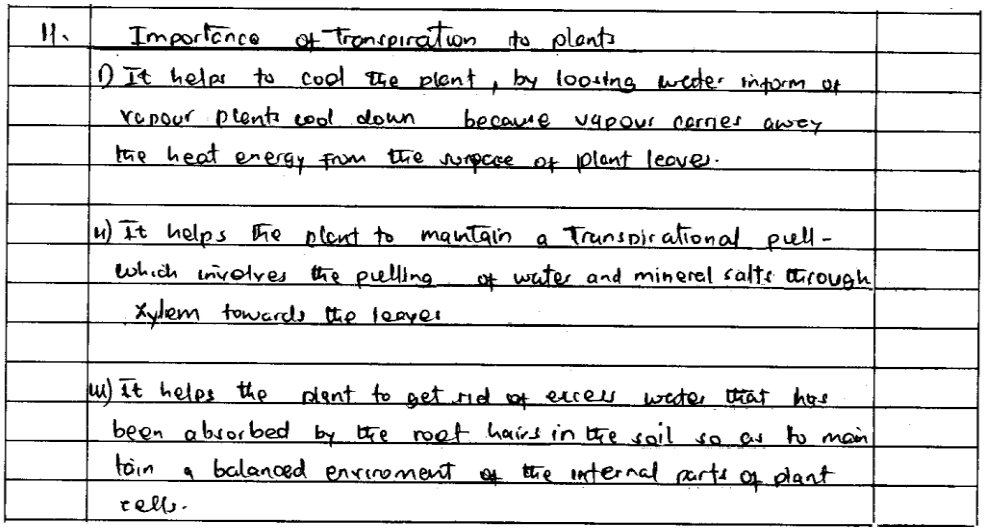


Figure 11: *Candidates' Performance in Question 11*

Figure 11 indicates that the general performance on this question was average because 35.77 per cent scored from 2 to 6 marks. The candidates who scored high marks (4 - 6) had adequate knowledge about absorption and movement of water and mineral salts in plants. Therefore, they correctly provided three importance of transpiration in plants. Extract 10.1 is a sample of the correct responses from one of the candidates.

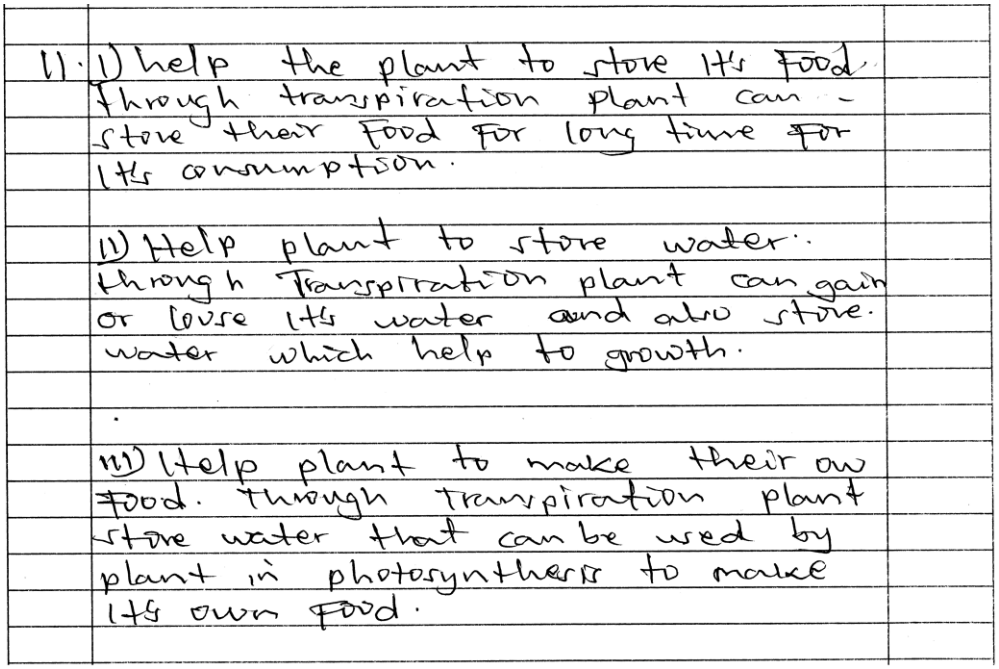


Extract 10.1: Candidate's correct responses to question 11

In Extract 10.1, the candidate correctly gave the importance of transpiration to plants.

The candidates who scored average marks (2 - 3.5) lost some marks because they gave one to two points on the importance of transpiration to plants. Some mixed the importance of transpiration with disadvantages of transpiration.

The candidates who scored low marks (0 - 1.5) responded incorrectly because they lacked sufficient knowledge of absorption and movement of water and mineral salts in plants. Some candidates explained the factors affecting transpiration such as *temperature, wind, size of the leaf, presence of cuticle, humidity* and *availability of soil moisture*. Other candidates explained the importance of photosynthesis as *produce oxygen, reduce carbon dioxide in the atmosphere* and *produce food*. Others wrote the conditions necessary for photosynthesis as *it help plants to get chlorophyll, sunlight* and *carbon dioxide.* Other incorrect responses observed in candidates' scripts were *help plants to drop leaves which increase soil fertility, help plants to preserve its water and help plants to remove old leaves and to gain new leaves*. Extract 10.2 is a sample of the candidates' incorrect responses.



Extract 10.2: Candidate's incorrect response to question 11

In Extract 10.2, the candidate wrote incorrect responses. For example, he/she wrote *help plant to store water* instead of helping plant to remove excess water, in (ii).

2.2.10 Question 12: Genetics

In this question, the candidates were given a situation that, A heterozygous normal skinned man married a heterozygous normal skinned woman. They gave birth to three normal skinned children and one albino child. The father complained that the albino child was not his. Then, the candidates were required to use genetic cross to find out whether the albino child belongs to the father or not.

The question was attempted by 521,963 (100%) candidates. Analysis shows that 313,379 (60.04%) candidates scored from 0 to 1.5 marks, out of whom, 199,758 (38.27%) scored 0 in this question. The candidates who scored from 2 to 3.5 marks were 82,818 (15.87%) whereby 125,766 (24.09%) scored from 4 to 6 marks. Further analysis shows that 8,211 (1.57%) candidates scored 6 marks, as shown in Figure 12.

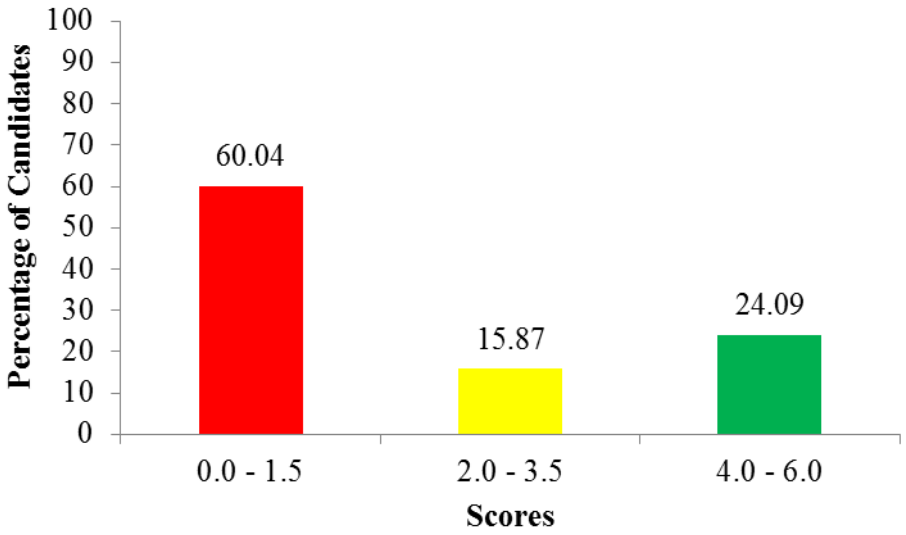
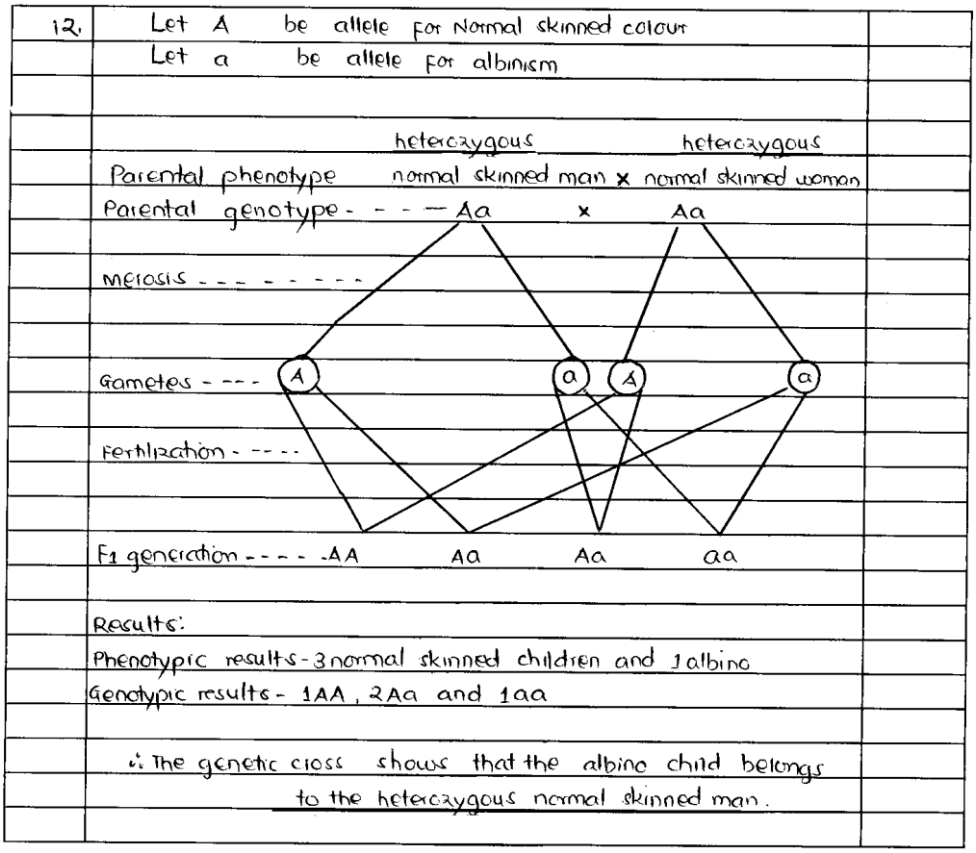


Figure 12: *Candidates' Performance in Question 12*

Figure 12 shows that the general performance on this question was average because 39.96 per cent of the candidates scored from 2 to 6 marks, out of the 6 marks allocated to this question. The candidates who scored high marks (4 - 6) demonstrated good mastery of principles of inheritance, specifically Mendelian inheritance. They were aware that allele for melanin production is dominant, while that for albinism is recessive. They were also aware that since the parents were heterozygous, then dissimilar alleles were to be used. Therefore, they defined the letter to be used and carried out genetic crosses following Mendelian inheritance to find out whether the albino child belongs to the father or not thus scored full marks. Extract 11.1 is a sample of the candidate's correct responses.



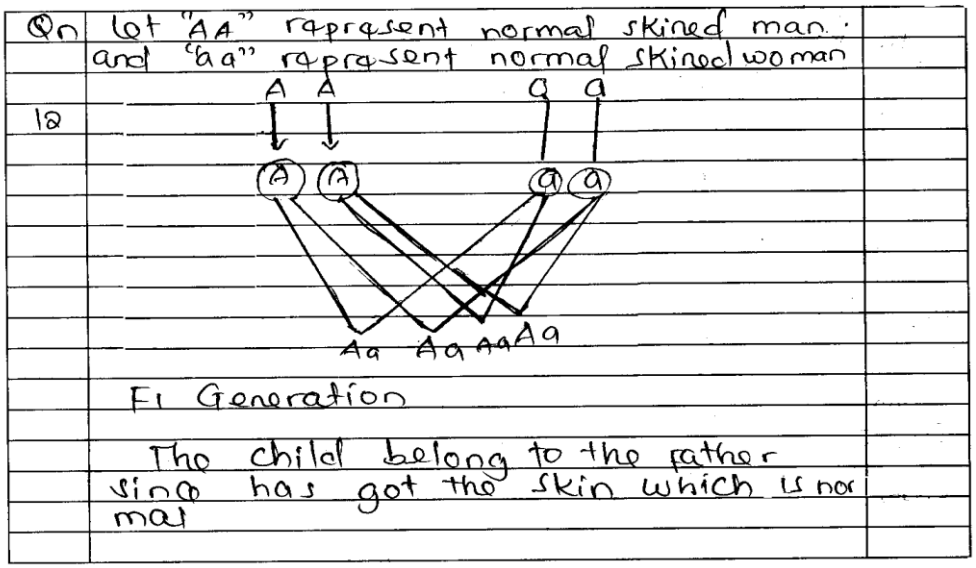
Extract 11.1: Candidate's correct response to question 12

In Extract 11.1, the candidate managed to conduct genetic cross between normal parents whose genotypes were heterozygous and confirmed from the F_1 results that the albino child belonged to the father.

The candidates who scored average marks (2 - 3.5) correctly defined letters to be used in a genetic cross to find the F_1 generation. However, they lost some marks because they only showed the formation of one to two offspring correctly. Some of them showed correctly the genetic cross between the parents, but failed to express the phenotypes and genotypes of the offspring.

The candidates who scored zero were not aware of the Mendelian inheritance. Therefore, they failed to show the genetic cross between parents. Some candidates used incorrect labels on diagrammatic crosses. For example, they wrote *phenotype* instead of *genotype*, *meiosis* instead of *gametes* and F_2 *generation* instead of F_1 *generation*. Others treated

albinism as sex linked characters. Therefore, they used sex chromosomes to represent allele of the character. For instance, one candidate wrote *XY* for normal skin and *xx* for albinism. Also, other candidates used Punnet square charts, instead of diagrammatic crosses, as the question required. Furthermore, some candidates used two different letters to represent the same trait, they wrote *Ab* and *aB* for heterozygous. Moreover, other candidates incorrectly used *AA* for heterozygous normal skinned man and *BB* for heterozygous normal skinned woman, instead of Aa or Bb. They failed to recognize that a capital letter represents a dominant character while the lower case represents a recessive character. The candidates were not aware that the normal skinned parents had both dominant and recessive alleles for the skin colour; normal skin allele was dominant over recessive albino allele. They were also not aware that albinism occurs only in homozygous recessive state. Extract 11.2 is a sample of the candidate's incorrect responses to question 12.



Extract 11.2: Candidate's incorrect response to question 12

In Extract 11.2, the candidates wrote *AA* and *aa* to represent normal skinned man and woman, instead of A to represent allele for normal skin colour and a to represent allele for albinism. Also, he/she used homozygous genes *AA* and *aa* instead of heterozygous genes Aa and Aa in a genetic cross. Therefore, he/she got all offspring with genotypes Aa, instead of *AA*, *2Aa* and *aa*.

2.3 SECTION C: Essay Questions

This section had three essay type questions 13, 14 and 15. Question 13 carried 15 marks, while questions 14 and 15 carried 10 marks each. The candidates were required to answer two questions including question 13 which was compulsory.

2.3.1 Question 13: Reproduction

In this question, the candidates were required to explain four family planning methods and indicate one disadvantage for each.

The analysis revealed that 521,963 (100%) candidates responded to this question. Data show that 176,282 (75.42%) scored from 0 to 4 marks, out of whom 393,658 (33.77%) scored 0 marks. The candidates who scored from 4.5 to 9.5 marks were 87,203 (16.71%), whereas 41,102 (7.87%) scored from 10 to 15 marks. Further analysis reveals that 5,343 (1.02%) candidates scored all the 15 marks, as shown in Figure 13.

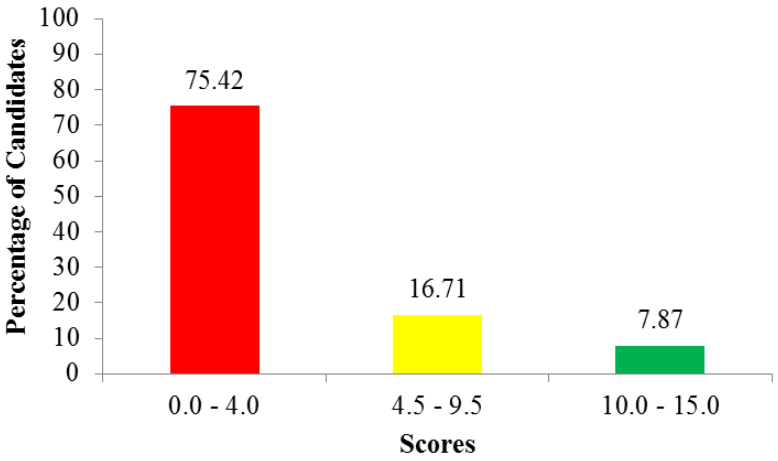
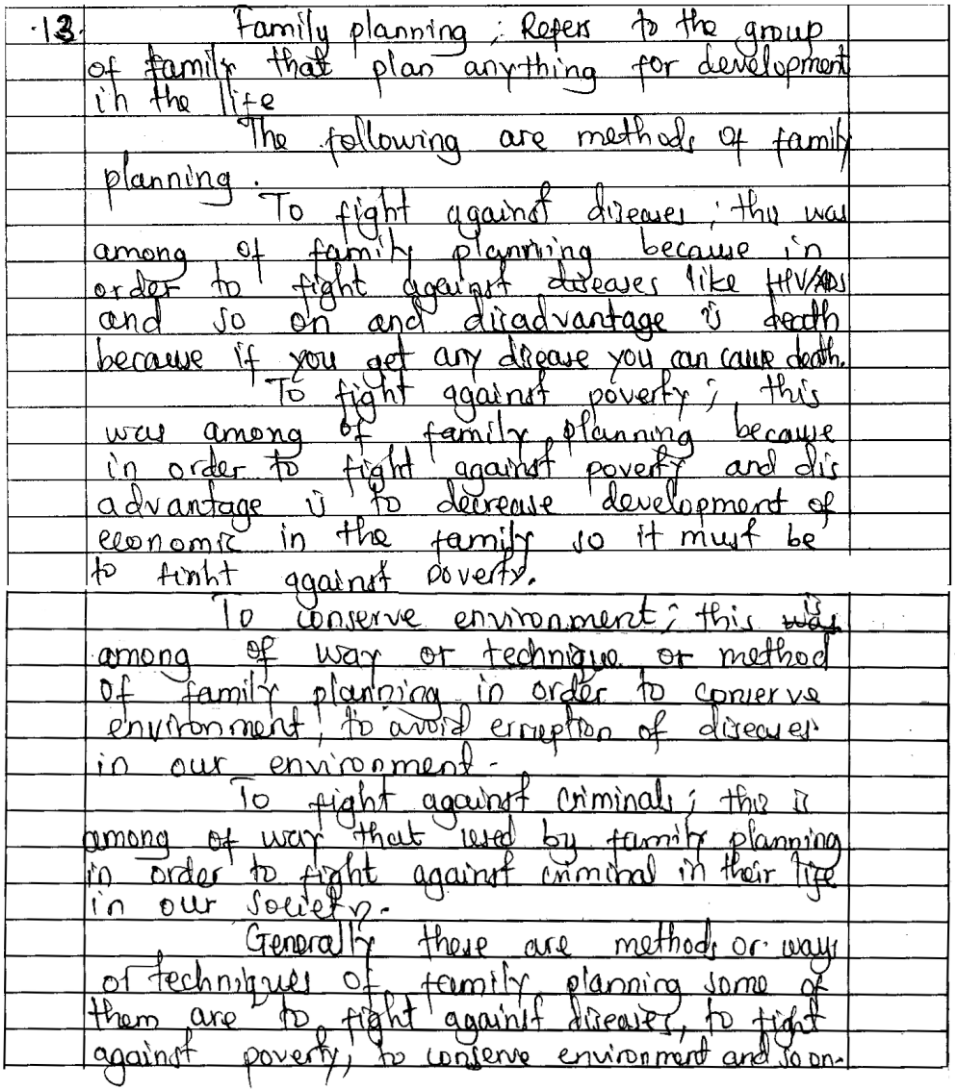


Figure 13: *Candidates' Performance in Question 13*

Figure 13 indicates that, the general performance on this question was weak because 75. 42 per cent scored from 0 to 4 marks. The candidates who scored low marks (0 - 4) had inadequate knowledge of family planning and contraception. Some of the candidates who scored 1 to 4 marks provided correct introduction and conclusion, but outlined one to two methods only while others provided either introduction or conclusion, and outlined the methods instead of explaining, hence scored low marks. The candidates

who scored 0 marks either did not understand the demands of the question, or they lacked knowledge of the tested concepts, thus provided incorrect responses. In the introduction, they were required to define family planning, but they wrote incorrect responses. For instance, one candidate defined family planning as *the plan by which a family sit down to discuss on how many houses should be built*. Another candidate defined it as *the system of family in which father and mother plan anything in the family and how to protect them*. Other candidate defined family planning *as the component of family consisting of father, mother and children.*

In the main body, they were required to explain the methods of family planning, and give a disadvantage for each, but most of the candidates wrote responses contrary to the demands of the question. Some of the candidates explained factors which hinder fertilization as *blockage of fallopian tube, blockage of sperm duct, production of weak or immature sperms* and *production of immature ovum.* Other candidates explained ways of reducing irresponsible sexual behaviours such as *avoid peer pressure, having appropriate knowledge about reproductive health, maintaining self-discipline and self-control* and *adopt good practices and atitudes.* Some of the candidates failed to understand the question demand as some explained the advantages of different family planning methods instead of their disadvantages such as *withdrawal method is costless, abstinence is hundred per cent effective* and *condoms prevents sexually transmitted diseases*. There were also other candidates who explained advantages of breast feeding such as *protect the baby from infection, provide the balanced diet for the baby, creates an emotional bond between the mother and the baby* and *does not require complicated preparations*. They gave incorrect conclusion as well. These candidates failed to understand that family planning methods include: Natural methods (rhythm method, cervical mucus and basal body temperature), chemical method (contraceptive pills, implants, spermicidal creams and birth control injections), mechanical methods (condom, sponge, diaphragm and intrauterine devices) and surgical methods/sterilisation. Extract 12.1(a) is a sample of the candidates' incorrect responses.


13. Family planning ; Refers to the group of family that plan anything for development in the life

The following are methods of family planning.

To fight against diseases ; this was among of family planning because in order to fight against diseases like HIV/AIDS and so on and disadvantage is death because if you get any disease you can cause death.

To fight against poverty ; this was among of family planning because in order to fight against poverty and dis advantage is to decrease development of economic in the family so it must be to finht against poverty.

To conserve environment ; this ~~was~~ among of way or technique or method of family planning in order to conserve environment, to avoid erruption of diseases in our environment.

To fight against criminals ; this is among of way that used by family planning in order to fight against criminal in their life in our society.

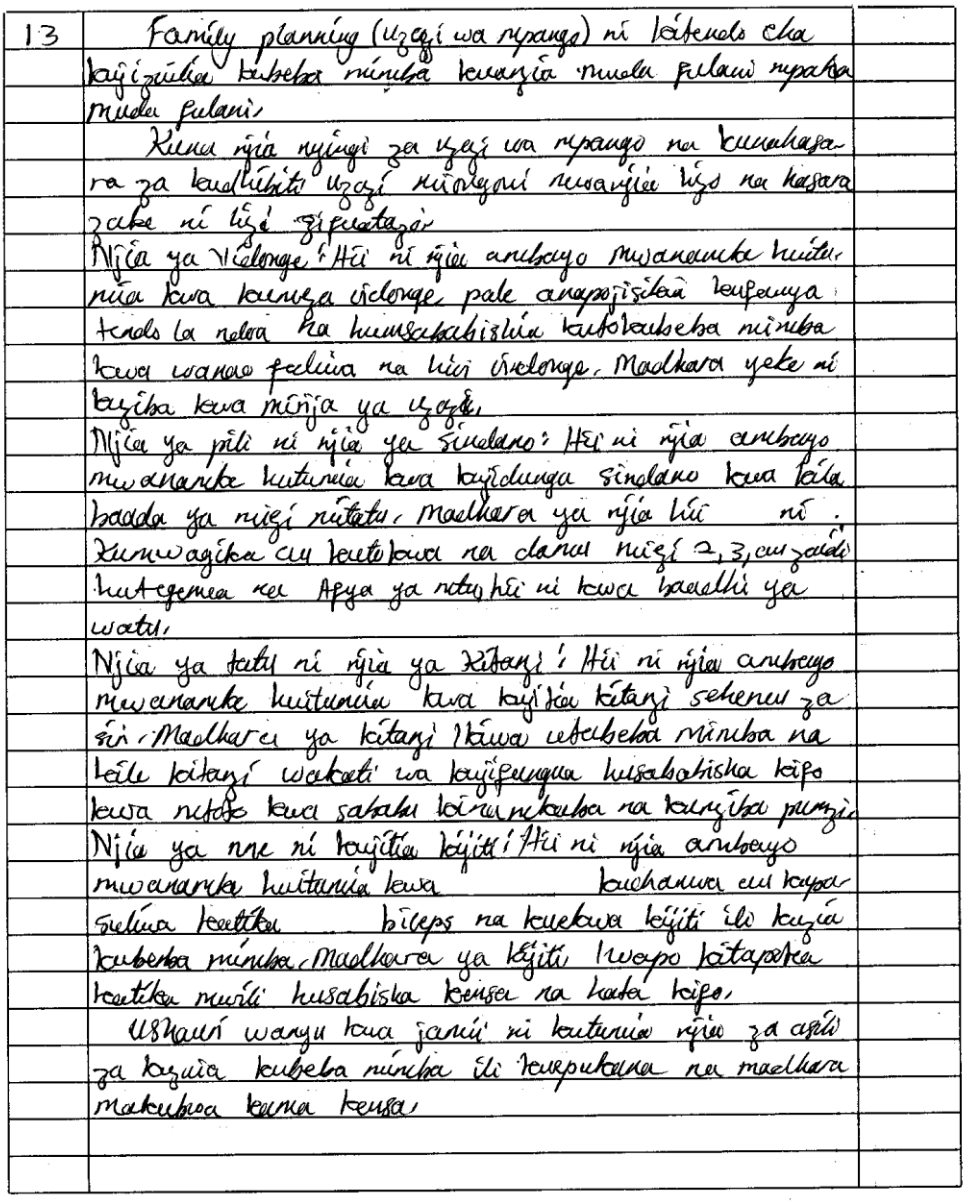
Generally these are methods or ways of techniques of family planning some of them are to fight against diseases, to fight against poverty, to conserve environment and so on.

Extract 12.1(a): Candidate's incorrect responses to question 13

In Extract 12.1(a), the candidate incorrectly defined family planning in the introduction. He/she explained things a family should take care of in order to have a healthy family such as *to fight against diseases* and *poverty* instead of family planning methods and their advantages. The conclusion was incorrect as well.

Further analysis of the candidate's response reveals that, some of the candidates failed to express their responses using English language. They used Kiswahili language contrary to the language of instruction, thus performed poorly. This implies that candidates had poor mastery of the

English language. Extract 12.1(b) is a response from the candidate who used Kiswahili language in answering question 13.


13 Family planning (uzazi wa mpango) ni kitendo cha kujizuilia kubeba mimba kwanzia muda fulani mpaka muda fulani.

Kuna njia nyingi za uzazi wa mpango na kuna hasara za kudhibiti uzazi. Miongoni mwa njia hizo na hasara zake ni hizi zifuatazo.

Njia ya vidonge: Hii ni njia ambayo mwanamke hutumia kwa kumeza vidonge pale anapojisikia kufanya tendo la ndoa na humsaidia kutobeba mimba kwa wanawe fulani na hizi vidonge. Madhara yake ni kuziba kwa mirija ya uzazi.

Njia ya pili ni njia ya sindano: Hii ni njia ambayo mwanamke hutumia kwa kujidunga sindano kwa kila baada ya miezi mitatu. Madhara ya njia hii ni kumwagika au kutokwa na damu miezi 2, 3, au zaidi hutegemea na afya ya mtu hii ni kwa baadhi ya watu.

Njia ya tatu ni njia ya kitanzi: Hii ni njia ambayo mwanamke hutumia kwa kujitia kitanzi sehemu za siri. Madhara ya kitanzi ikiwa utabeba mimba na kile kitanzi wakati wa kujifungua husababisha kifo kwa mtoto kwa sababu kinamchoma na kuziba pumzi.

Njia ya nne ni kujitia kijiti: Hii ni njia ambayo mwanamke hutumia kwa kuchanwa au kupasuliwa katika biceps na kuwekwa kijiti ili kuzuia kubeba mimba. Madhara ya kijiti iwapo kitapotea katika mwili husababisha kensa na hata kifo.

Ushauri wangu kwa jamii ni kutumia njia za asili za kuzuia kubeba mimba ili kuepukana na madhara makubwa kama kensa.

Extract 12.1 (b): Candidate's incorrect response to question 13

In Extract 12.1(b), the candidates used Kiswahili in responding to the question. He/ she wrote correct introduction, and correctly outlined methods of family planning such as kutumia vidonge (use of contraceptive

pills), kutumia sindano (use of injection), thus lost marks due to the use of Kiswahili which was not the language of instruction.

The candidates who scored average marks (4.5 - 9.5) gave a correct introduction and conclusion, but explained two to three methods of family planning, providing one to two disadvantages. Also, some candidates correctly explained the methods of family planning but failed to clarify its disadvantages. In addition, some explained the methods of family planning with two to three advantages, but they did not provide introduction and conclusion, contrary to essay writing rules, thus lost some marks.

The candidates who scored high marks (10 - 15) explained correctly the family planning methods and indicated one disadvantage for each method. This indicates that the candidates had adequate knowledge about family planning and contraception. Extract 12.2 is a sample of the candidates' correct responses.

13. Family Planning is the process whereby couples agree to have the required number of babies or Children with in a certain interval. Family planning methods are the ways used between married people, to prevent Pregnancy so that only required number of babies are born with in a certain period of time. The methods are categorized into Chemical methods, barrier methods, natural methods and the following are family planning methods and their disadvantage in each.

Use of condoms. This is a barrier method in which it involves the use of small plastic like bags called condoms that are worn in male and female reproductive organs during sexual intercourse. The male condom help to prevent sperms from reaching female reproductive ovum during copulation. Likewise the female condom prevent entry of sperms that can cause Pregnancy after fertilization. The disadvantage is that this method is not effective 99% because some of the sperms might Penetrate and enter the vagina causing pregnancy to a woman.

use of contraceptive pills. This is a Chemical Method that involves, a woman taking contraceptive pills that are made of artificial oestrogen and Progesterone hormones which cause disturbance in the Normal menstrual period. The artificial oestrogen and Progesterone hinder occurence of ovulation periods which, when copulation is done by couples cannot result into pregnancy hence facilitates family planning. ALSO

13. the disadvantage of using contraceptive pills is that A woman might forget to take the contraceptive pills regularly as required hence when copulation takes place she is likely to get pregnancy and conceive.

Withdrawal (coitus) Method. This is a natural method of family planning whereby the man withdraws (removes) his penis from the vagina before ejaculation. The man should withdraw his penis before climax that can lead to deposition of sperms into the woman's vagina. This method needs the consent and willing of an individual during copulation and it is rarely practised among married people because the Man might unwillingily forget to withdraw his penis especially after climax causing deposition of sperms in the vagina hence occurence of pregnancy.

Intra-uterine device method. This is a method of family planning that involves the use of intra-uterine devices which are loop like structures inserted to the female part called uterus for the purpose of preventing implantation. Implantation takes place after fertilization whereby the zygote moves to the uterus. The intra-uterine devices can be bent into different shapes and are kept by a specialist doctor in the uterus of a woman to prevent pregnancy. The disadvantage of this method is that, when it is kept in a wrong way can cause destruction of the female reproductive system and it is not 100% effective to prevent pregnancy.

Conclusively. Family planning is very important in the following ways, it helps the couple to have children only when they need, allows the couple to have the number of children that they are capable of taking care of.

Extract 12.2: Candidate's correct responses to question 13

In Extract 12.2, the candidate explained correctly four family planning methods and indicated one disadvantage for each.

2.3.2 Question 14: Nutrition

In this question, the candidates were required to explain four importance for plants to carry out photosynthesis.

The question was attempted by 324,605 (62.19%) candidates. Analysis of the candidates' performance shows that, 238,415 (73.45%) scored from 0 to 2.5 marks, out of whom 125,445 (38.65%) scored 0 out of 10 marks allocated to this question. The candidates who scored from 3 to 6 marks were 61,854 (19.05%), whereas 24,336 (7.50%) scored from 6.5 to 10 marks. Further analysis shows that 2,563 (0.79%) candidates scored 10 marks in this question, as shown in Figure 14.

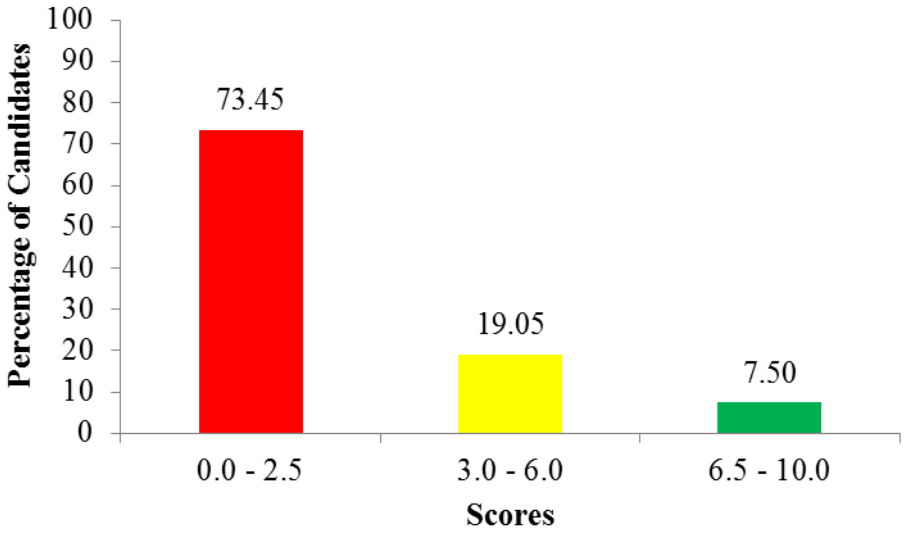
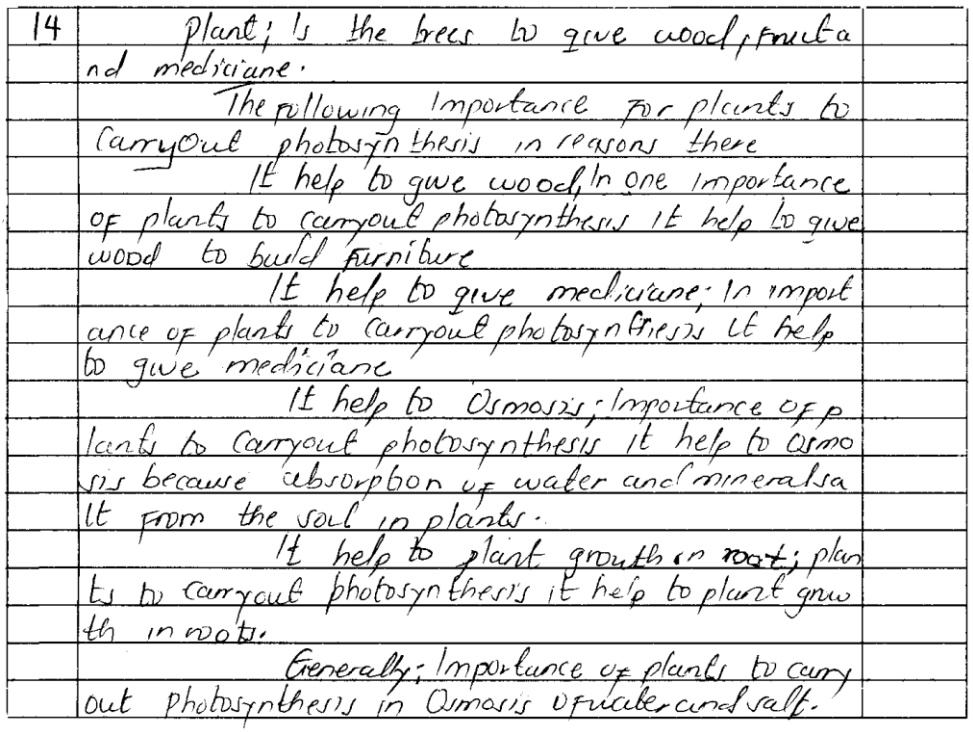


Figure 14: *Candidates' Performance in Question 14*

Based on Figure 14, the general performance on this question was weak because 73. 45 per cent of the candidates scored from 0 to 2.5 marks. The candidates who scored low marks (0 - 2.5) had insufficient knowledge about photosynthesis. Most of the candidates who scored 1 to 2 marks wrote correct introduction and mentioned two to three importance of photosynthesis without explanation. Furthermore, the candidates who scored 0 marks wrote irrelevant introduction, and also failed to explain the importance of photosynthesis. For instance, one candidate wrote *photosynthesis is a process where plants produce energy*. Some candidates did not write introduction and conclusion, and even for those who provided these parts, they wrote incorrect responses.

In the main body, some of the candidates explained factors affecting photosynthesis such as *carbon dioxide concentration, light intensity* and *glucose concentration.* Others explained the raw materials and conditions of photosynthesis such as *chlorophyll, carbon dioxide, sunlight* and *water*.

Also, other candidates explained factors affecting the rate of transpiration such *as size of the leaf, position of stomata, wind* and *temperature*. There were also other candidates who drew well labelled diagrams showing internal and external structures of the leaf, and wrote their functions instead of explaining the importance of photosynthesis. This indicates that the candidate lacked sufficient knowledge about the topic of nutrition, specifically photosynthesis. Extract 13.1 illustrates a candidate's incorrect responses.

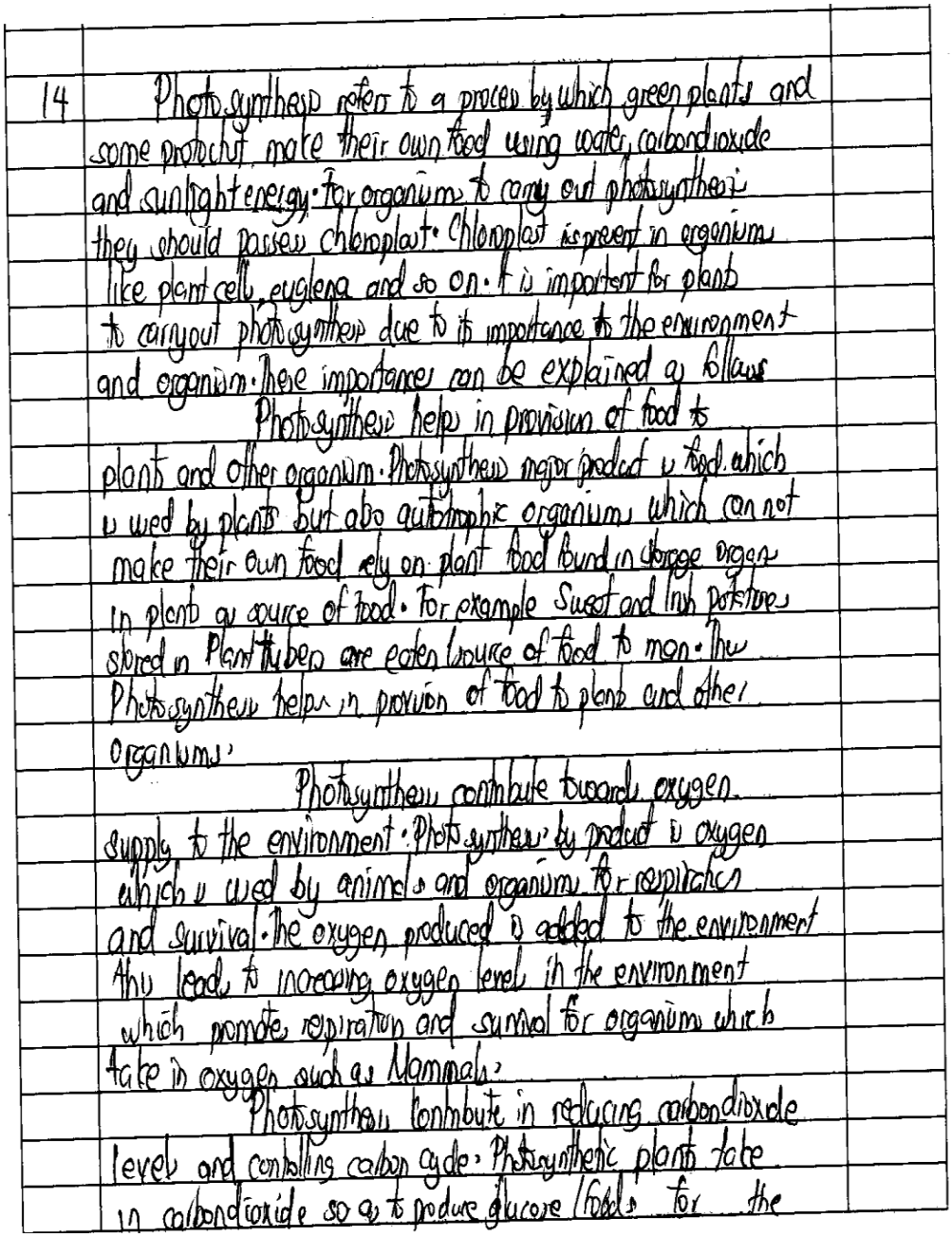

14 plant; Is the brees to give wood, fruita nd medicine.
The following Importance for plants to Carryout photosynthesis in reasons there
It help to give wood, In one importance of plants to carryout photosynthesis it help to give wood to build furnibure
It help to give medicine; In import ance of plants to carryout photosynthesis it help to give medicine
It help to Osmosis; Importance of p lants to carryout photosynthesis it help to osmo sis because absorption of water and mineralsa lt from the soil in plants.
It help to plant growth in root; plan ts to carryout photosynthesis it help to plant grow th in roots.
Generally; Importance of plants to carry out photosynthesis in Osmosis of water and salt.

Extract 13.1: Candidate's incorrect responses to question 14

In Extract 13.1, the candidate provided incorrect introduction. In the main body, he/she wrote the advantages of plants such as *it help to give wood* instead of the importance of photosynthesis. The conclusion was incorrect as well.

On the other hand, candidates who scored average marks (3 - 6) gave a correct introduction and conclusion, but explained two to three importance of photosynthesis. In addition, some explained the importance, but provided either introduction or conclusion, thus lost some marks.

The candidates who scored high marks (6.5 - 10) explained correctly the importance of photosynthesis. This shows that the candidates had sufficient knowledge about the topic of Nutrition, particularly photosynthesis. Extract 13.2 is a sample of the correct responses from one of the candidates.

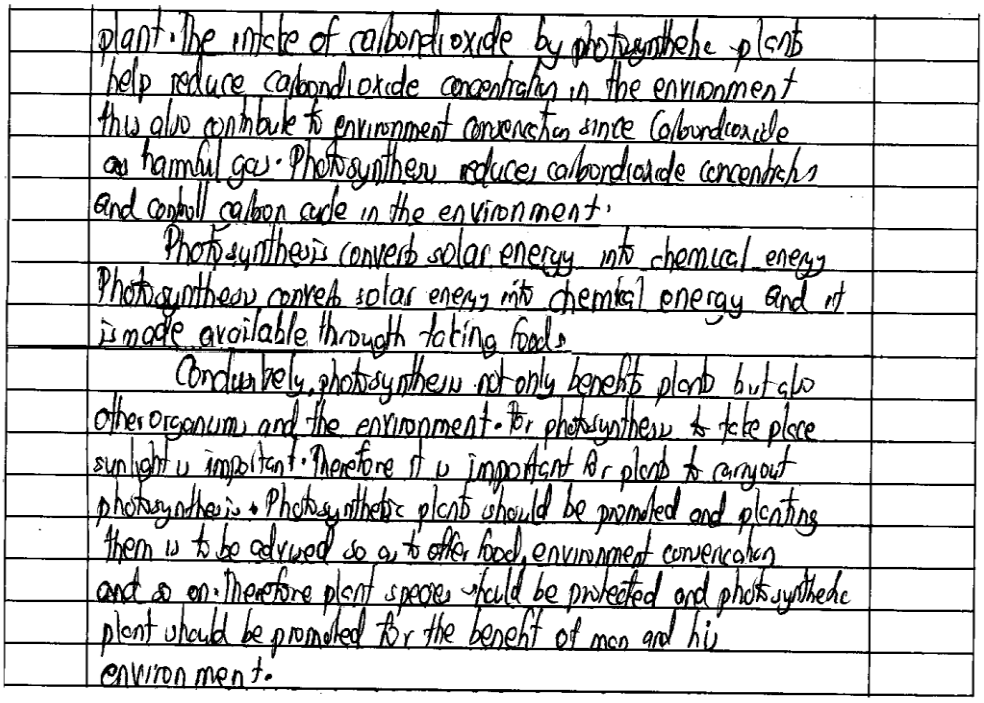


14 Photosynthesis refers to a process by which green plants and some prokaryot make their own food using water, carbondioxide and sunlight energy. For organisms to carry out photosynthesis they should posses chloroplast. Chloroplast is present in organisms like plant cell, euglena and so on. It is important for plants to carryout photosynthesis due to its importance to the environment and organism. These importance can be explained as follows

Photosynthesis helps in provision of food to plants and other organism. Photosynthesis major product is food which is used by plants but also autotrophic organisms which can not make their own food rely on plant food found in storage organ in plant as source of food. For example Sweet and Irish potatoes stored in Plant tubers are eaten source of food to man. The Photosynthesis helps in provision of food to plants and other organisms.

Photosynthesis contribute towards oxygen supply to the environment. Photosynthesis by product is oxygen which is used by animals and organisms for respiration and survival. The oxygen produced is added to the environment thus leads to increasing oxygen level in the environment which promote respiration and survival for organisms which take in oxygen such as Mammals.

Photosynthesis contribute in reducing carbondioxide level and controlling carbon cycle. Photosynthetic plants take in carbondioxide so as to produce glucose (food) for the


plant. The intake of carbondioxide by photosynthetic plants help reduce carbondioxide concentration in the environment this also contribute to environment conservation since Carbondioxide as harmful gas. Photosynthesis reduces carbondioxide concentration and control carbon cycle in the environment.

Photosynthesis converts solar energy into chemical energy Photosynthesis converts solar energy into chemical energy and it is made available through taking food.

Conclusively, photosynthesis not only benefits plants but also other organisms and the environment. For photosynthesis to take place sunlight is important. Therefore it is important for plants to carryout photosynthesis. Photosynthetic plants should be promoted and planting them is to be advised so as to offer food, environment conservation and so on. Therefore plant species should be protected and photosynthetic plant should be promoted for the benefit of man and his environment.

Extract 13.2: Candidate's correct response to question 14

In Extract 13.2, the candidate explained correctly the importance for the plants to carry out photosynthesis.

2.3.3 Question 15: Classification of Living Things

The candidates were given a statement, ''Many people believe that insects are harmful to man, hence they find poisonous chemicals to eradicate them.'' Candidates were required to explain with examples four ways in which insects are useful to man.

The question was attempted by 197,388 (37.81%) candidates. Data shows that 57,844 (29.30%) scored from 0 to 2.5 marks, out of whom 18,173 (9.21%) scored 0 marks. The candidates who scored from 3 to 6 marks were 65,534 (33.21%), whereas 74,010 (37.49%) scored from 6.5 to 10 marks. Further analysis shows that 6,498 (3.29%) candidates scored all the 10 marks, as shown in Figure15.

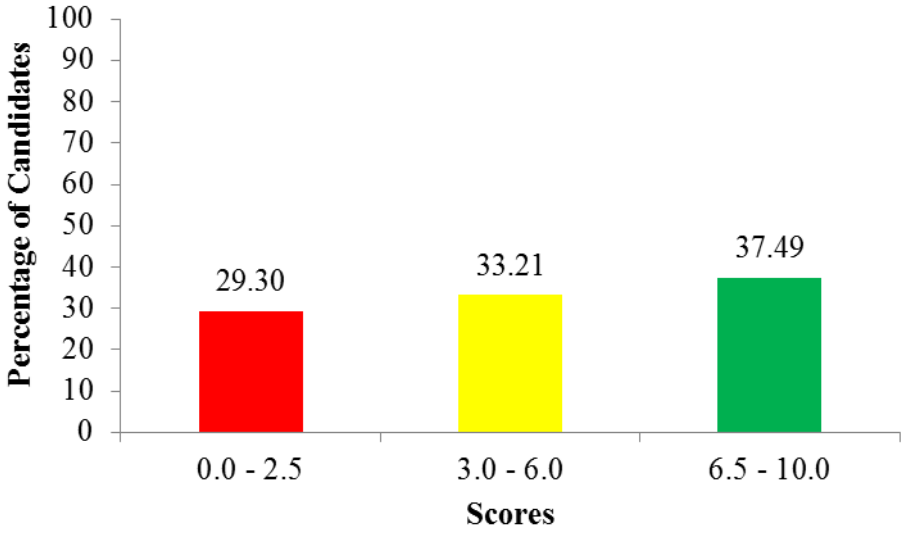


Figure 15: *Candidates' Performance in Question 15*

Figure 15 indicates that the general performance on this question was good because 70.70 per cent of the candidates scored from 3 to 10 marks. The candidates who scored high marks (6.5 - 10) explained correctly ways in which insects are useful to man giving examples. They organized their responses in an essay form, providing correct introduction, main body and conclusion. This indicates that the candidates had adequate knowledge about the phylum Arthropoda, from the topic of Classification of Living Things. Extract 14.1 is a sample of the candidate's correct responses.

15. Insects are living organisms found in Kingdom animalia, phylum Arthropoda and class insecta. They have bodies which are divided into three parts head, thorax and abdomen.
Examples of insects include; honey bees, butterflies and houseflies. Also insects have characteristics such as one pair of wings and one pair of antennae. Insects are useful to man in many different ways as follows;

Provide food to man; Insects help human beings to obtain food for survival. Fa example insects such as locusts and termites are eaten as food by human beings and are a good source of proteins and also honey bees produce honey which is used as medicine by human beings.

Provide man with raw materials; Some insects produce substances or materials which are used as raw materials by man. Forexample, honey bees produce wax which is used in industries.

Insects are agents of pollination; Insects such as bees and butterflies help to pollinate flowering plants since they are among the agents of pollination. This helps to promote fertilization in plants like maize, mango trees among others. Thus, insects help in crop production in farms among agriculturalists.

Insects are used as decorations; Insects are used by man for decorating purposes. Forexample insects like butterflies with different colours can be used for decorating homes and also offices since they provide a good visual impression.

Conclusively, insects are very important to man in different ways, although they have various disadvantages such as spreading diseases, causing pain forexample bee stings and also destroying of crops by insects like grasshoppers.

15. Insects are living organisms found in Kingdom animalia, phylum arthropoda and class insecta. They have bodies which are divided into three parts head, thorax and abdomen.
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Insects are used as decorations; Insects are used by man for decorating purposes. Forexample insects like butterflies with different colours can be used for decorating homes and also offices since they provide a good visual impression.

Conclusively, insects are very important to man in different ways, although they have various disadvantages such as causing and spreading diseases, causing pain forexample bee stings and also destroying of crops by insects like grasshoppers.

Extract 14.1: Candidate's correct responses to question 15

In Extract 14.1, the candidate correctly explained the ways in which insects are useful to man, giving correct examples, thus scored high marks. The candidate also had good command of the English language and good essay writing skills.

Conversely, for the candidates who scored from 3 to 6 marks, most of them explained correctly two to three ways in which insects are useful to man, while others outlined the points without explanations. Some of them did not provide introduction and conclusion, thus lost some marks.

The candidates who scored low marks (0 - 2.5) either did not understand the demand of the question or lacked knowledge about Phylum Arthropoda. Most of the candidates who scored 1 to 2 marks wrote one correct point with neither introduction nor conclusion, while others outlined the points only. For those who scored 0 marks, most of them provided incorrect responses. For instance, one candidate wrote *insects are organisms which have body divided into two parts*. Another candidate *wrote insects are organisms which have chelicera.*

In the main body, some of the candidates explained general features of Phylum Arthropoda such *as have jointed appendages, have segmented body, they are multicellular* and *have heterotrophic nutrition* instead of explaining the importance of insects. Others explained disadvantages of insects as *they are vectors of different diseases, cause injuries to human being* and *destroy timber and crops*. Others explained features of birds such as *the body is covered with feathers, the anterior pair of limbs is modified into wings* and *the mouth is modified into a beak* instead of explaining the ways in which insects are useful to man. Extract 14.2 is a sample of candidate's incorrect responses.

15. INSECTS

Insects are organisms which are the members of class aracnicles where by insects are very important to humans but some people believe that insects are harmful to man hence they are finding poisonous Chemicals to eradicate them. The following are the ways in which insects are useful to man.

Insects have two pairs of wings which help them to escape from danger. Where by insects use their wings to fly from one place to another and also to escape from danger. Where by through wings insects can no be able to be caught by human.

Insects have one pair of antennae which enable them for sensitivity. for example; Spider which enable it to sense it there is danger and be able to escape it where by the antennae they transport impulses which bring about response to man.

Insects have three pairs of legs for locomotion. Where these pairs of legs which it used for locomotion enabled it to search for food, mate and to escape from danger. Where by locomotion refers to the movement of the whole body part of an organism.

Insects have stings which are poisonous for their defense. forexample; honey bee has stings where by when it bite a person can cause health problems to that peo person where by it can even died because of the poison which is dangerous.

In conclusion, apart from their useful to human they are also important.

Extract 14.2: Candidate's incorrect responses to question 15

In Extract 14.2, the candidate wrote incorrect responses. For example, he/she wrote *insects are members of class arachnida* instead of class insecta in the introduction. He/she explained the characteristics of members in class insecta instead of explaining the ways in which insects are useful to man. The conclusion was incorrect as well.

3.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE ON EACH QUESTION IN 033/2 - BIOLOGY 2

This section analyses a practical examination which had three alternative papers, namely 033/2A Biology 2A, 033/2B Biology 2B and 033/3C Biology 2C. The candidate had to do only one of these alternatives. Each paper comprised two (2) questions. Question 1 was set from the topic of Reproduction, while question 2 was set from Classification of Living Things. The analysis of the candidates' performance on each paper in Biology 2 starts with question 1 of all the alternative papers 033/2A Biology 2A, 033/2B Biology 2B and 033/2C Biology 2C followed by question 2.

3.1 Question 1: Reproduction

This question was performed in three alternatives 033/2A, 033/2B and 033/2C. Analysis of the candidates' performance for the three alternatives is presented as follows:

The question was attempted by 518,464 candidates. Analysis shows that 238,890 (46.08%) candidates scored from 0 to 7 marks, out of whom 40,601 (7.83%) scored 0 in this question. The candidates who scored from 7.5 to 16 marks were 208,364 (40.19%). 71,210 (13.73%) scored from 16.5 to 25 marks. Further analysis shows that 853 (0.16%) candidates scored 25 marks in this question. Figure 16 summarizes the candidates' performance in question 1 for all alternative papers, namely A, B and C.

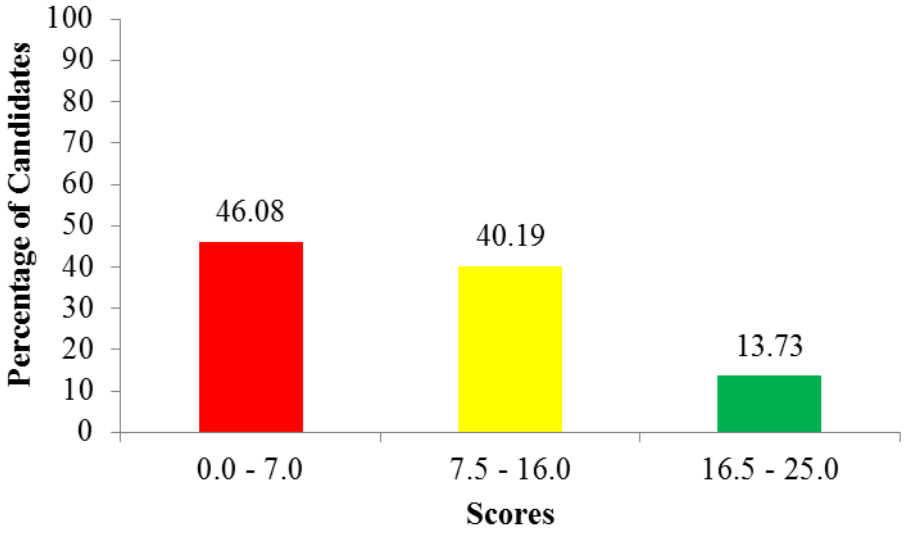


Figure 16: *Candidates' Performance in Question 1*

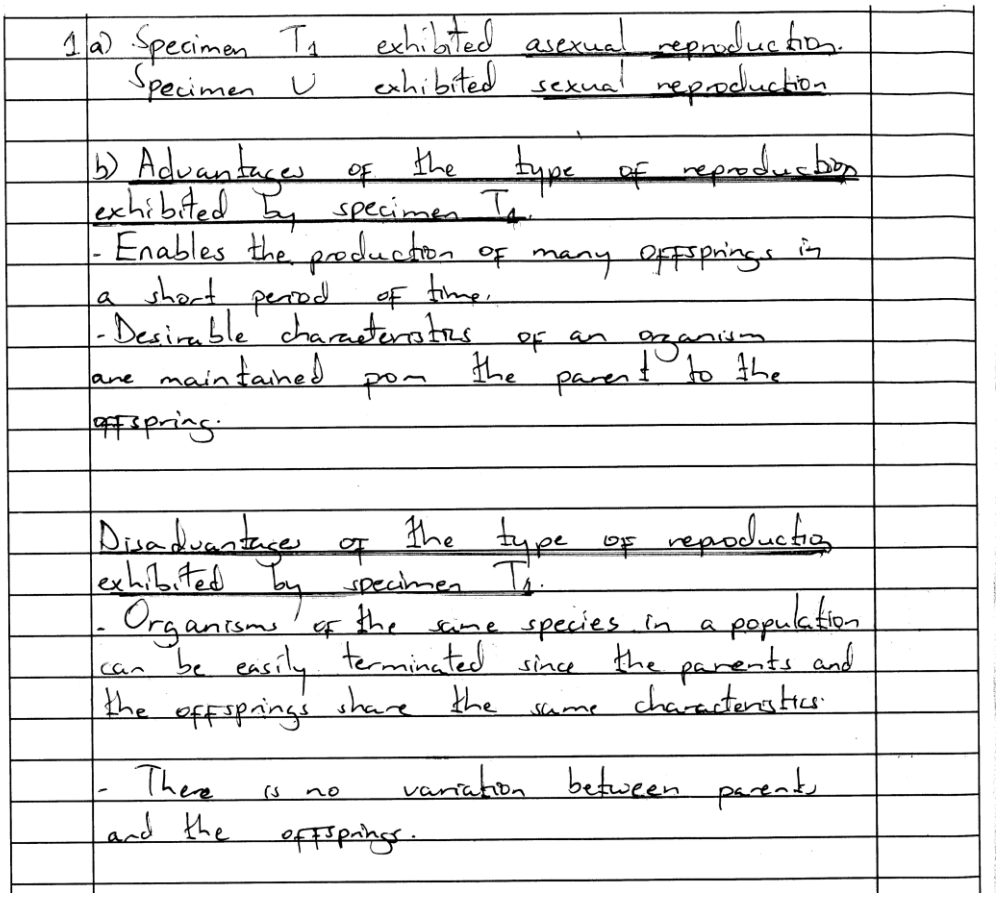
3.1.1 033/2A Biology 2A

Question 1 in alternative 2A had five parts (a) - (e), carrying a total of 25 marks. The candidates were provided with longitudinal sections of specimens T_1 (Onion bulb) and U (Hibiscus flower) with their cutting side facing upward. Then, the candidates were required to study the specimens carefully and answer the following questions:

(a) *What is the type of reproduction exhibited by specimen* ***T_1*** *and* ***U****?*
(b) *Give two advantages and disadvantages of the types of reproduction exhibited by specimen* ***T_1***.
(c) *Draw the diagrams of specimens* ***T_1*** *and* ***U*** *and label their internal and external parts.*
(d) *Which process would not proceed normally if the internal part of specimens* ***U*** *and* ***T_1*** *are totally removed from live plants?*
(e) *State two economic importance of specimen* ***T_1*** *in our daily life.*

As shown in Figure 16, the general performance on question 1 for all alternative papers (A, B and C) was average because 53.92 per cent of the candidates scored from 7.5 to 25 marks. The analysis shows that the candidates who scored high marks (16.5 - 25) had sufficient knowledge about the types of reproduction. They were aware of the types of reproduction found in onion bulb and hibiscus flower. Therefore, they gave

advantages and disadvantages of the types of reproduction correctly. They demonstrated good drawing skills, thus drew large correct diagrams of specimens T_1 and U and labelled their internal and external parts. In addition, they wrote a caption for the diagram. Also, they correctly identified the process that would not proceed normally if the internal part of specimens U and T1 are totally removed from live plants, and stated the economic importance of specimen T_1 in daily life. Extract 15.1 is a sample of the candidates' correct response to question 1 paper 2A.



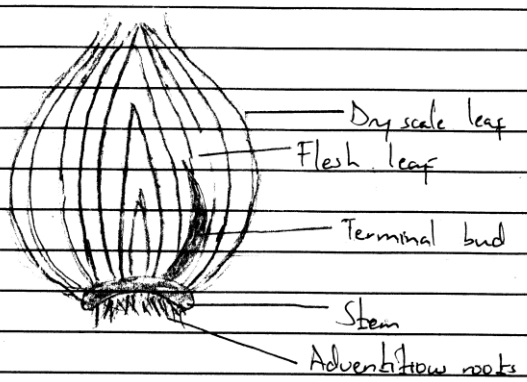
1 a) Specimen T_1 exhibited asexual reproduction.
Specimen U exhibited sexual reproduction

b) Advantages of the type of reproduction exhibited by specimen T_1.
- Enables the production of many offsprings in a short period of time.
- Desirable characteristics of an organism are maintained from the parent to the offspring.

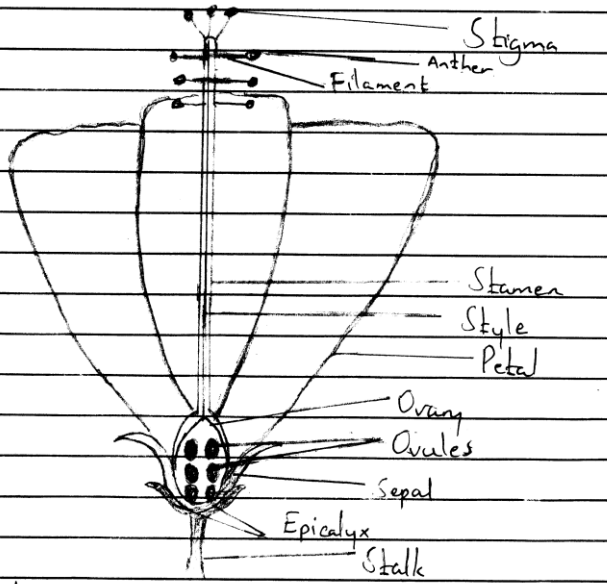
Disadvantages of the type of reproduction exhibited by specimen T_1.
- Organisms of the same species in a population can be easily terminated since the parents and the offsprings share the same characteristics.

- There is no variation between parents and the offsprings.

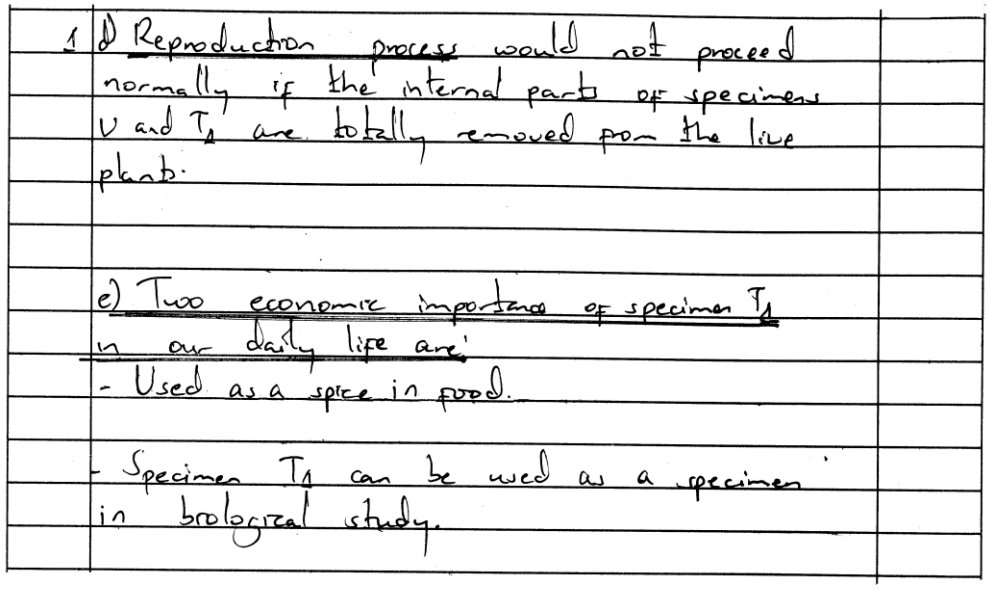
1 c)



The diagram of specimen T showing its internal and external parts.



The diagram of specimen U showing its internal and external parts.



Extract 15.1: Candidate's correct responses to question 1 paper 2A

In Extract 15.1, the candidate managed to give correct responses in all parts of the question, and hence, scored all the marks.

On the other hand, the candidates who scored average marks (7.5 - 16) obtained most of the marks in parts (a) (b) and (e). However, in part (c), they lost some of the marks because they drew the diagrams with fewer labels, while others provided incorrect labels.

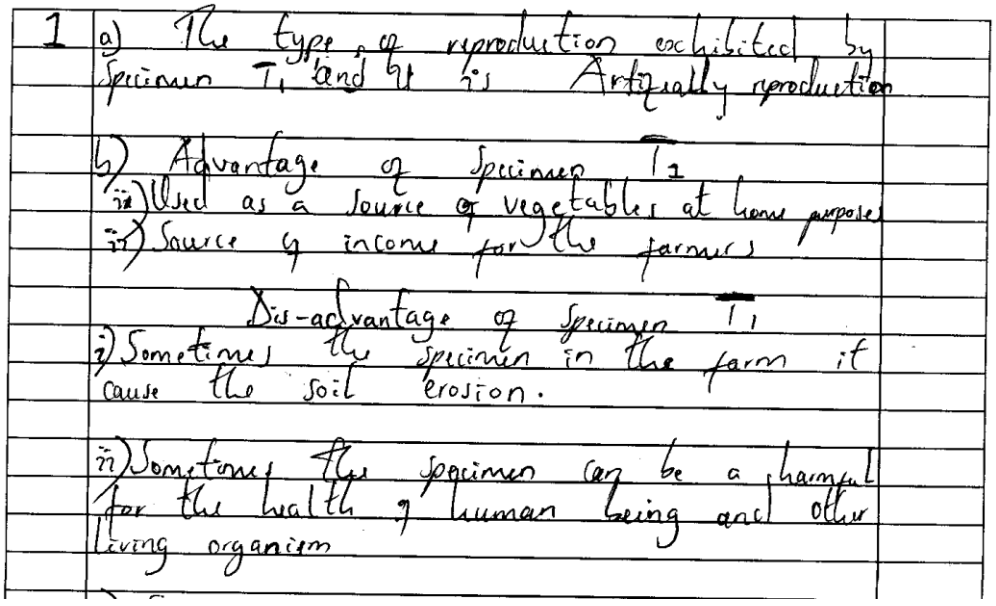
The candidates who scored low marks (0 - 7) provided incorrect responses in all or most parts of the question signifying lack or inadequate knowledge about Reproduction. For example, in part (a), some of the candidates stated characteristics of living things such as *growing, excretion, regulation* and *feeding* instead of asexual reproduction, and specimen U reproduce by *pollination* instead of sexual reproduction. Also, some of them wrote *internal* and *external fertilization*. The incorrect responses indicate that candidates had inadequate knowledge about the types of reproduction.

In part (b), some of the candidates stated characteristics of specimen T_1 such as *presence of chlorophyll, having roots and stem.* Others stated about uses of specimen T_1 such as *used as food* and *used for commercial purposes* instead of advantages and disadvantages of asexual reproduction.

In part (c), some of the candidates drew *Irish potato tuber* instead of onion bulb. Others drew a diagram of onion bulb with incorrect labelling, thus lost some marks. For the diagram of hibiscus flower, some of the candidates drew a *diagram of a leaf* instead of hibiscus flower, while others drew hibiscus flower with incorrect labelling, hence lost some marks. The incorrect responses indicate that the candidates had inadequate knowledge about reproduction in plants.

Also, in part (d), some of the candidates responded by stating other characteristics of living organisms such as *excretion*, *movement*, *and regulation* instead of reproduction and growth. Other candidates stated the general features of plants such as *presence of chlorophyll*, *roots*, *stem* and *leaves*, while others drew diagrams which were not part of the question. The incorrect responses indicate that candidates had inadequate knowledge about the functions of different reproductive organs in plants.

Similarly, in part (e), some of the candidates stated characteristics of plants such as *they are flowering plants*, *they have roots*, *they have stem and leaves* instead of the economic importance of specimen T_1. Others drew the structure of specimen T_1. The incorrect responses show that, the candidates lacked enough knowledge about the importance of onion. Extract 15.2 is a sample of the candidates' incorrect response to question 1 paper 2A.


1 a) The type of reproduction exhibited by specimen T_1 and it is Artificially reproduction

b) Advantage of specimen T_1

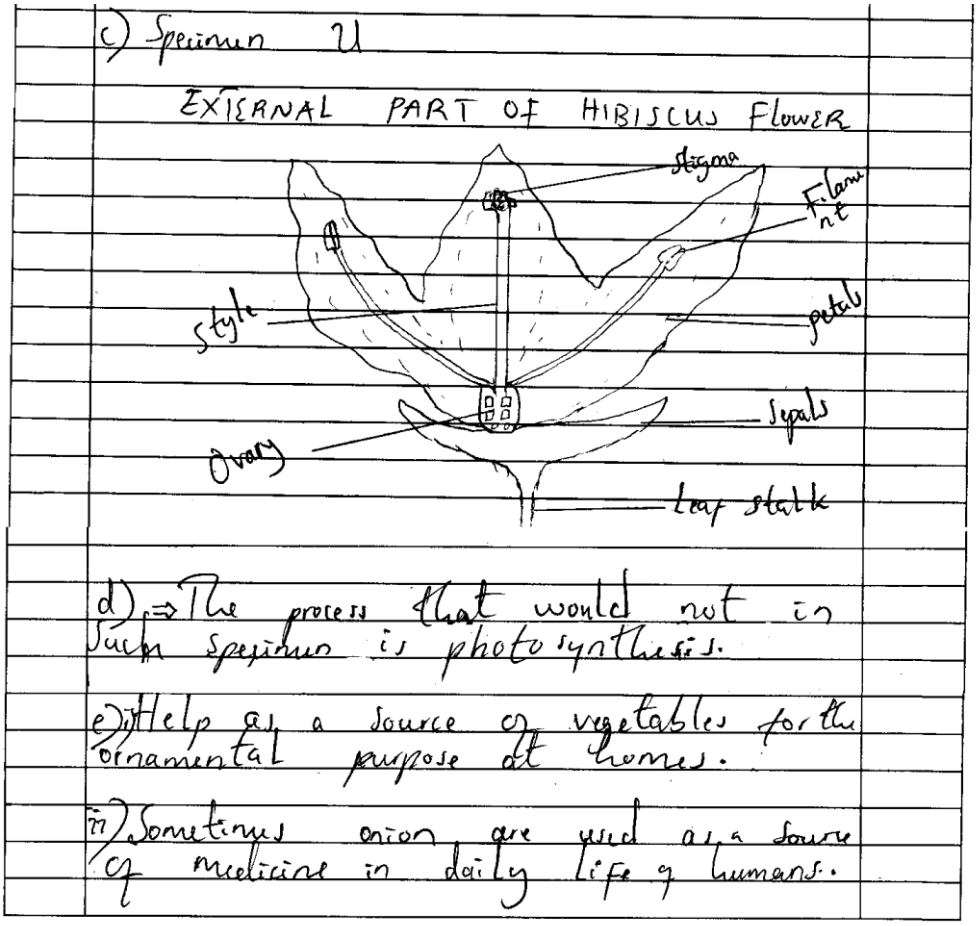
ii) Used as a source of vegetables at home purposes

iii) Source of income for the farmers

Dis-advantage of specimen T_1

i) Sometimes the specimen in the farm it cause the soil erosion.

ii) Sometimes the specimen can be a harmful for the health of human being and other living organism



Extract 15.2*:* Candidates' incorrect responses to question 1 paper 2A

In Extract 15.2, the candidate correctly outlined the economic importance of specimen T_1 in daily life. However, he/she wrote *artificial reproduction* as a type of reproduction exhibited by both specimens T_1 and U instead of asexual and sexual reproduction, in part (a). In part (b), he/she stated the advantages and disadvantages of specimen T_1 instead of the advantages and disadvantages of the types of reproduction exhibited by T_1 and U. In part (c), he/she drew a diagram of a different flower instead of drawing the diagram of hibiscus. Also, he/she did not draw the diagram of specimen T_1.

3.1.2 033/2B Biology 2B

Question 1 in alternative 2B had six parts (a) - (f), carrying a total of 25 marks. The candidates were provided with specimens A (dissected female

rat/mouse/guinea pig), B (hibiscus flower) and specimen C (cassava stem). Then, they were required to answer the following questions:

(a) *Observe carefully the displayed reproductive system in the specimen A, then draw a well labelled diagram of the reproductive system only.*

(b) *Carefully remove the sepals, petals and completely peel off the stamen tube to fully display carpel of specimen B, then draw a well labelled diagram of the carpel.*

(c) *State four similar functions performed by reproductive system in diagram 1(a) and the carpel in 1(b). Present your work under criteria shown in the following table:*

Table of similarities in 1(a) and 1(b)

S/N	***Criteria***	***Similar Functions***	
		Reproductive system in 1(a)	***Carpel in 1(b)***
(i)	*Reception of gametes*		
(ii)	*Production of gametes*		
(iii)	*Fertilization site*		
(iv)	*Zygote development*		

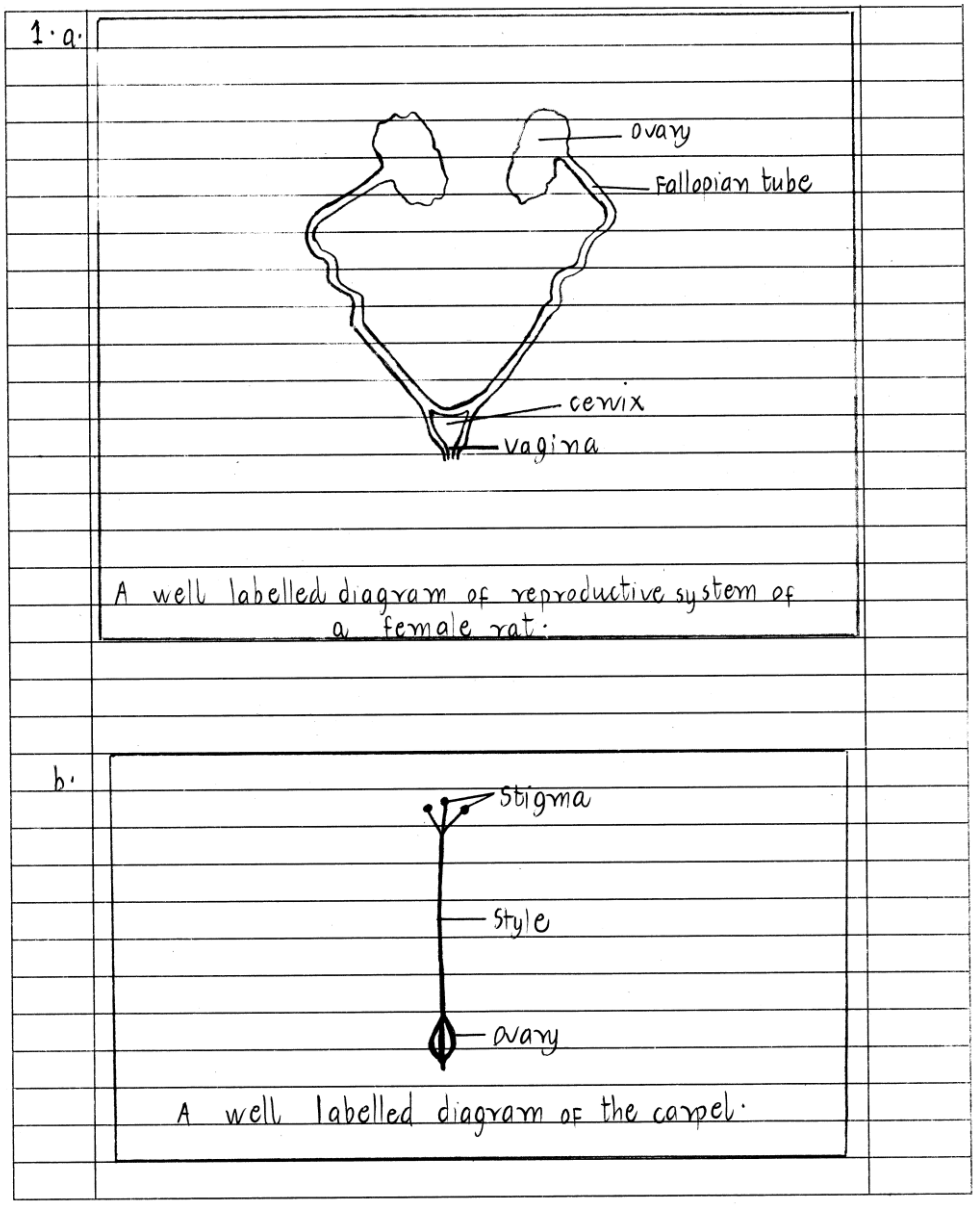
(d) *What is the type of reproduction exhibited by the plant which specimen C was taken? Give a reason to support your answer.*

(e) *Briefly explain how the specimen C is propagated for reproduction of new plant.*

(f) *In what ways the products from the specimen C is useful to human being. Give three points*

The candidates who scored high marks (16.5 - 25) gave correct responses to most parts of the question. These candidates had adequate knowledge about reproduction. They had good drawing skills, thus drew large well labelled diagram of the reproductive system of specimen, in part (a). Also, they removed the sepals, petals and completely peeled off the stamen tube to fully display carpel of specimen B, then drew a well labelled diagram of the

carpel, in part (b). They stated the similar functions performed by reproductive system in diagram 1(a) and the carpel in 1(b), and identified the type of reproduction exhibited by the plant which specimen C was taken. They also provided a reason in parts (d) and (e). Furthermore, the candidates provided ways in which the products from the specimen C are useful to human being. Extract 16.1 is a sample of the candidates' correct responses to question 1 paper 2B.



1. c.

S/N	Criteria	Similar Functions	
		Reproductive system in 1(a)	Carpel in 1(b)
(i)	Reception of gametes	Vagina receives male gametes	Stigma receives male gametes
(ii)	Production of gametes	Ovary produces ovum	Ovary produces Ovules
(iii)	Fertilization site	In the oviduct	In the Ovary
(iv)	Zygote development	Zygote develops in the uterus	Zygote develops in the ovary

(d) The type of reproduction exhibited by the plant which specimen C was taken from is asexual reproduction by vegetative propagation.

Reason;

Asexual reproduction does not involves fusion of gametes and no gametes are involved for reproduction.

(e) Specimen C is cut OFF from its stem and then shifted to be planted into the soil where it develops into a new plant, this is what is referred to as vegetative propagation by cutting.

(f) ~~Adv~~ Usefulness of products of specimen C to human being;-

(i) Source of fuel.

(ii) Source of income to those who sell them.

(iii) It can be used as a medicine.

Extract 16.1: Candidate's correct response to question 1 paper 2B

In Extract 16.1, the candidate provided correct responses in all parts of the question. This shows that the candidate had adequate knowledge about the system of reproduction.

The candidates who scored average marks (7.5 - 16) obtained most of the marks in parts (a), (b), (d) (e) and (f). However, they lost some of the marks

in part (c) because they failed to state four similar functions performed by reproductive system in diagram 1(a) and the carpel in 1(b).

Conversely, the candidates who scored from 0 to 7 marks wrote incorrect responses in all or some parts of the question. For instance, in part (a), some of the candidate drew incorrect diagram of *female reproductive system of human being* instead of the diagram of female reproductive system of a rat, while others drew the diagram of the specimens which were not part of the question, such as *dog and bird*. Also, some of the candidates drew female reproductive system of a rat with wrong labelling, hence loss of marks. In part (b), some of the candidates drew *stamen* instead of a diagram of carpel. Others drew the whole hibiscus flower without parts of carpel, while others drew the diagram of specimens which were not part of the question, such as *honey bee* and *millipede*. The incorrect responses indicate that candidates had inadequate knowledge of the structure of reproductive system of a flower.

Also, in part (c) (i), some of the candidates stated incorrect sexual organs in dissected rat and in carpel, such as *cervix, vulva, anther* and *style.* Others stated parts of cells such as *cytoplasm*, *cell membrane*, *nucleus* and *cell wall* while others stated differences between plants and animals such as *plants can produce their own food and animals cannot produce their own food* instead of vagina as a part which receives female gametes in rat and stigma in carpel. In part (c) (ii), most of the candidates stated sex of dissected rat and carpel as *female sex* instead of site for production of gametes. Others stated size of gametes such as *big and small size*, while others stated about survival of gametes such as *long period of time* and *short period of time to reach the ovary* instead of ovary as site for gametes production in rat/mouse/guinea pig and in carpel. Likewise, in part (c) (iii), most of the candidates stated *types of fertilization such as internal and external.* Others stated agents of fertilization such as *water, wind, insects* and *animals*, while others drew diagrams of ovary which was not part of the question, instead of oviduct as site for fertilization in rat/mouse/guinea pig and ovary in carpel. In part (c) (iv), some of the candidates stated time for embryo development instead of the part for embryo development. For example, some candidates wrote *nine months*. Others stated about features of zygote such as *rapid growth*, while others wrote about developmental stages in human being such as *neonatal* and *adolescence stage* instead of

uterus, a part where zygote implants and develops in rat/mouse/guinea pig and ovary in carpel. The incorrect responses indicate that candidates had inadequate knowledge about the structure of flower and reproductive structure of mammals.

Similarly, in part (d), some of the candidates named *sexual reproduction* due to gametes formation and presence of seeds. Others named advantages of asexual reproduction, such as *involves one parent and maintains genetic stability* instead of asexual reproduction due to presence of lateral bud. They were not aware that bud has rapid growing cells capable for formation of new plants or has node for root formation and one parent is used/gametes are not used. This indicates that, candidates had inadequate knowledge of the differences between sexual and asexual reproduction. Similarly, in part (e), some of the candidates explained *propagation by grafting, budding which involves the attachment of a part of plant or bud to a second rooted plant* respectively. Others explained about *seed germination,* while others explained about features of specimen C, such as *ability to make its own food* instead of propagation by using stem cuttings where by cuttings should have nodes which give rise to lateral buds.

In part (f), most of the candidates who had poor performance responded by giving characteristics of specimen C such as *presence of chlorophyll*, *presence of vascular bundles* and *reproducing asexually*. Others wrote about disadvantages of specimen C such as *destructions of clothes and foods*, while others drew a diagram of specimen C instead of uses to human, such as root tubers powder are used for ironing, it is also used as glue in making ornaments. Extract 16.2 is a sample of the incorrect responses to question 1 paper 2B from one of the candidates.

01. a)

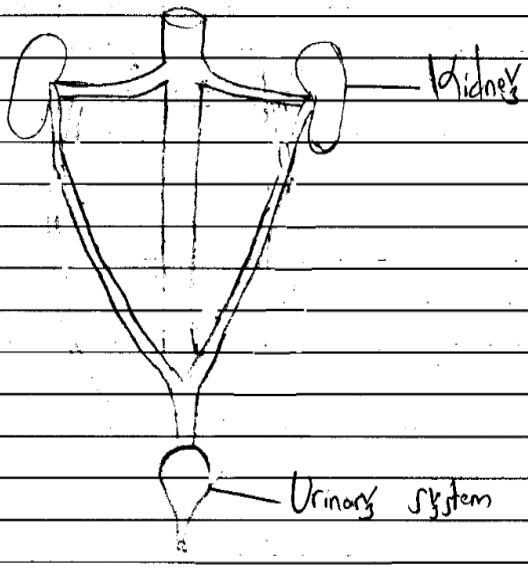


Fig 2: DIAGRAM OF REPRODUCTIVE SYSTEM

b)

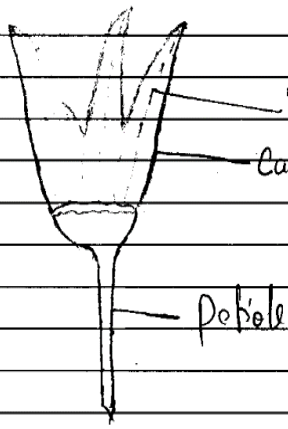


Fig 3: DIAGRAM OF CARPEL

1. c). TABLE OF SIMILARITIES IN 1(a) and 1(b).

S/N	CRITERIA	SIMILAR FUNCTION	
		Reproduction system in 1(a)	Carpel in 1(b)
ii)	Reception of gametes	It recept the gamete in the ovary	It recept the gamete in the ovary.
iii)	production of gametes	It produce the gamete in a testes.	It produce the gamete in a stigma.
iii)	fertilization site	It fertilize in a ovary	It fertilize in a ovuduct
iv)	Zygote development	Zygote it develope in placental	Zygote it delope in ovulation

d) The type of reproduction system in a specimen C is sexually because it involve the introduction of gamete from the ~~famal~~ Male.

e) The specimen C is propagated for propagated for reproduction of new plant where the place of the tree they a lowed down that place they develop the steam and they develop the small ~~tre~~ leaf antily the grow

1 i) It used in eating.
Where they are taken a peel of the ~~of~~ outer layer of the cassava.

ii) It increase fertile soil.

iii) It is a source of food to human being.

Extract 16.2: Candidate's incorrect responses to question 1 paper 2B

In Extract 16.2, the candidate drew diagram of *urinary system of specimen* A instead of reproductive system in part (a). Also, in part (c), he/she incorrectly stated an *ovary* as a site for receiving gametes in specimens A and B instead of vagina in specimen A and stigma in specimen B. Moreover, the responses given in other parts were incorrect.

3.1.3 033/2C Biology 2C

Question 1 in alternative 2C had five parts (a) - (e) carrying a total of 25 marks. The candidates were provided with specimen C_1 (dissected rat/mouse/guinea pig), D (matured fern plant) and E (Irish potato tuber). Then, they were required to answer the following questions:

(a) Observe the displayed reproduction system in the dissected specimen C_1 and then answer the following questions;
  (i) What is a sex of the specimen? Give a reason to support your answer.
  (ii) Draw a well labelled diagram of the reproductive system observed in dissected specimen.

(b) Carefully use the hand lens to observe the structures used for reproduction in specimen D and then draw a diagram of a frond with its reproductive structures.

(c) What are types of reproduction exhibited by specimen D and E? Give a reason on each to support your answer.

(d) Briefly explain how the type of reproduction in specimens D and E occurs.

(e) In what ways are specimens D and E useful to human being. Give two points for each.

The candidates who scored high marks (16.5- 25) gave correct responses to most parts of the question. They correctly identified the sex of the specimen C_1 and gave supportive reason. Also, they drew a well labelled diagram of the reproductive system observed in dissected specimen in part (a). In addition, they correctly drew a diagram of a frond with its reproductive structures and correctly listed the types of reproduction exhibited by specimen D and E in parts (b) and (c). Furthermore, they explained correctly the type of reproduction occurring in specimens D and E, and the ways in which specimens D and E are useful to human being in parts (d) and (e). These responses indicate that the candidates had adequate knowledge about reproduction. Extract 17.1 is a sample of the candidates' correct responses to question 1 paper 2C.

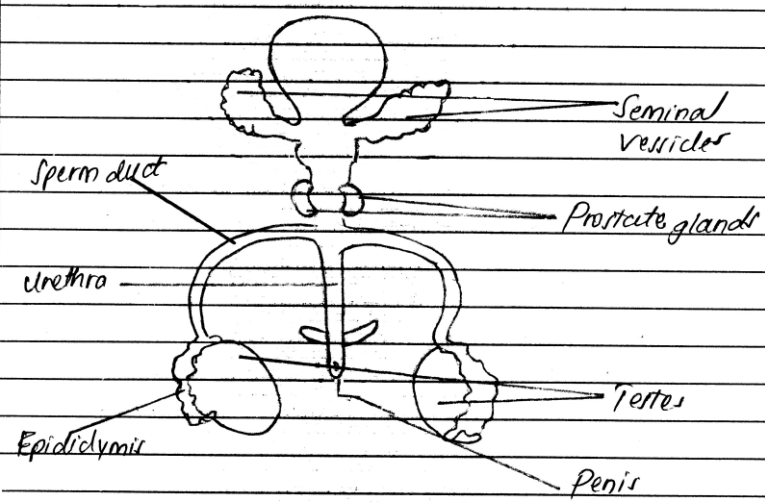
01. (a) (i) The sex of the specimen C_1 is **MALE**

Because;

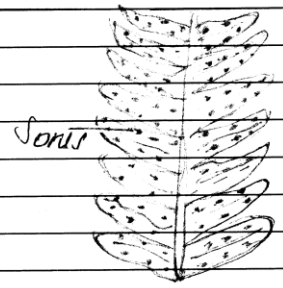
- It has seminal vesicles, testes and sperm duct which are common only in **Male** sex

(ii).

A DIAGRAM OF SPECIMEN C_1's REPRODUCTIVE SYSTEM.



(b) A DIAGRAM OF A FROND



01. (c) Specimen A

- It exhibited Asexual reproduction

Because

- During Asexual reproduction sori burst to release spores

Specimen E

- It exhibited asexual reproduction

- By Natural vegetative propagation, whereby a new plant arise from eyelbud of the specimen

(d) In SPECIMEN A

- reproduction occurs when the sors burst to release spores which germinate in the soil into new plant

In SPECIMEN E

- reproduction (Asexual reproduction) occurs through Natural vegetative propagation whereby the new spec organism of the same species arise from the eyelbud of the specimen E (Irish potato).

Hence, reproduction occurs.

01. (e)

Useful of specimen A

- specimen A act as a source of food
- It act as Ornaments and also used to prevent soil erosion.

Useful of specimen E

- It is used as a source of food to human being which consist of nutrients like starch.
- It is used in biological studies

Extract 17.1: Candidate's correct responses to question 1 paper 2C

In Extract 17.1, the candidate provided correct responses in parts (b), (c), (d) and (e). In part (a), he/she identified the sex of specimen C and

correctly justified it, but the diagram did not well represent the dissection; thus the candidate lost some marks.

On the contrary, the candidates who scored low marks (0 - 7) lacked sufficient knowledge about reproduction, thus provided incorrect responses to some or most parts of the question. For the candidates who scored 0 marks, most of them provided incorrect responses in all parts of the question. For example in part (a) (i), some of the candidates stated sex of specimen C_1 as *female,* and gave reasons such as *ability to give birth, to grow* and *to excrete*. Also, other candidates highlighted the parts of female reproductive system such as *vagina, uterus,* and *fallopian tubes* instead of male sex for specimen C_1 due to presence of testis with scrotum, penis, seminal vesicles, sperm ducts and urethra for passage of sperms.

In part (a) (ii), some of the candidates incorrectly drew and labelled a diagram of female reproductive system, instead of male reproductive system while others drew male reproductive system of rat and incorrect labelling. Also, there were some candidates who drew the diagram of rat with labelled parts which were not asked in the question *such as toes, leg and tail*. The incorrect responses indicate that the candidates had inadequate knowledge about the structure of reproductive system in rat.

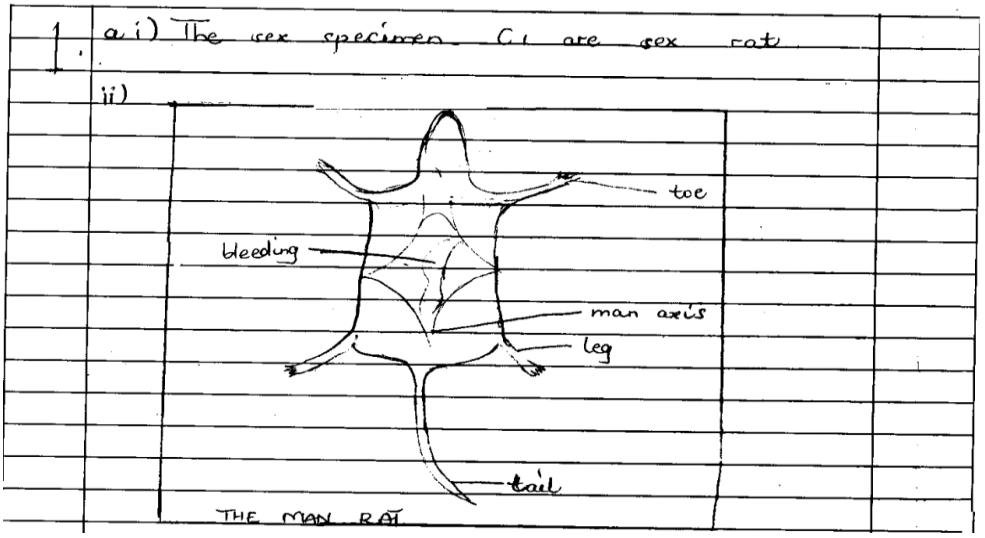
In part (b), some of the candidates incorrectly responded by drawing the whole specimen D (matured fern plant), and labelled some parts such as *stem and leaves*. Other candidates drew moss plant, while others drew external structure of a simple leaf. These candidates failed to understand the required diagram which was a frond with sori, as the reproductive structures of matured fern plant.

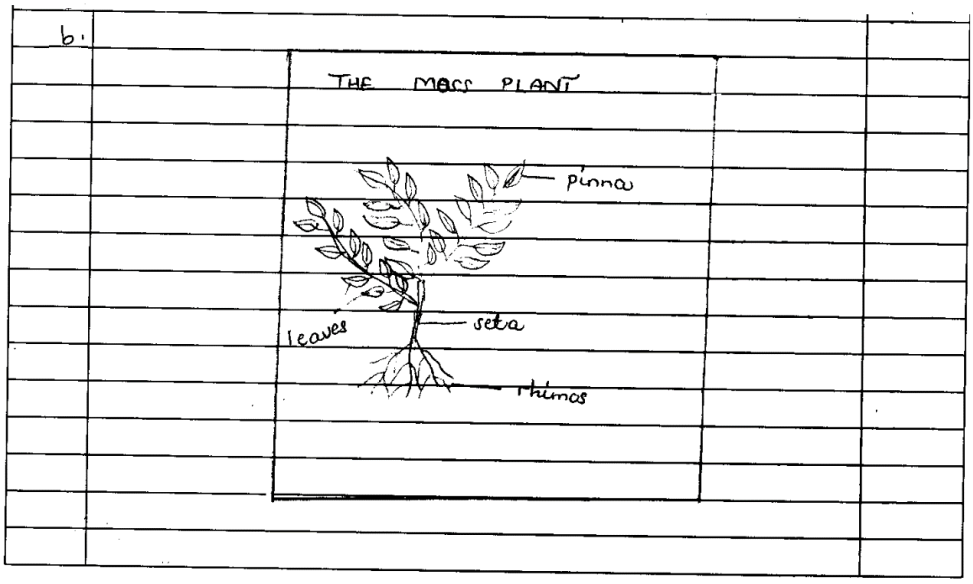
In part (c), some of the candidates incorrectly identified types of reproduction exhibited by specimens D and E as *sexual reproduction* by *budding, by cutting and by layering* due *to presence of seeds, involvement of two parents,* while others stated characteristics of plants, such as *reproduction, growth* and *regulation* instead of asexual reproduction, a type of reproduction exhibited for specimens D and E. These candidates were not aware that specimen D consists of sori, which contains reproductive cells for production of spores, while specimen E have buds which consist of rapid growing cell capable of forming new plants without gametes

formation such that only one parent is involved. The incorrect responses indicate that candidates had inadequate understanding on the types of reproduction in plants.

In part (d), some of the candidates incorrectly explained the types of reproduction in specimens D and E. For example, in specimen D, candidates wrote *it occurs through propagation by grafting, by cuttings.* Other candidates wrote *propagation by layering* instead of asexual reproduction, which occurs when matured spore from the sori/sorus land on the moist soil and germinate into young fern. In specimen E, candidates described as *it occurs by leaf bud, layering* and *suckers* instead of asexual reproduction when stem tuber is subjected to favourable conditions. The incorrect responses indicate that candidates had inadequate knowledge about types of asexual reproduction in plants.

In part (e), some of the candidates stated characteristics of specimen D and E such as *can be found in moist areas, have true roots, stem and leaves, producing flowers and fruits*. Other candidates drew diagrams of specimen D and E. Also, some candidates classified specimens D and E to *Kingdom Plantae* instead of stating uses of specimens D and E. Extract 17.2 is a sample of the candidate's incorrect responses to question 1 paper 2C.





Extract 17.2: Candidate's incorrect response to question 1 paper 2C parts (a) and (b)

In Extract 17.2, the candidate wrote incorrect responses in all parts of the question. For example, in part (a) (ii), he/she drew a diagram of a rat instead of the reproductive system of a rat. He/she drew diagram of moss plant instead of a diagram of frond, in part (b).

3.2 Question 2: Classification of Living Things

This question was performed in three alternatives: 033/2A, 033/2B and 033/2C. Analysis of the candidates' performance for the three alternatives is presented as follows:

The question was attempted by 518,464 candidates. Analysis shows that 198,422 (38.27%) candidates scored from 0 to 7 marks out of whom, 52,292 (10.09%) scored 0 in this question. The candidates who scored from 7.5 to 16 marks were 228,922 (44.16%). 91,120 (17.57%) scored from 16.5 to 25 marks. Further analysis shows that 853 (0.09%) candidates scored 25 marks in this question. Figure 17 summarizes the candidates' performance in question 2 for all alternative papers, namely A, B and C.

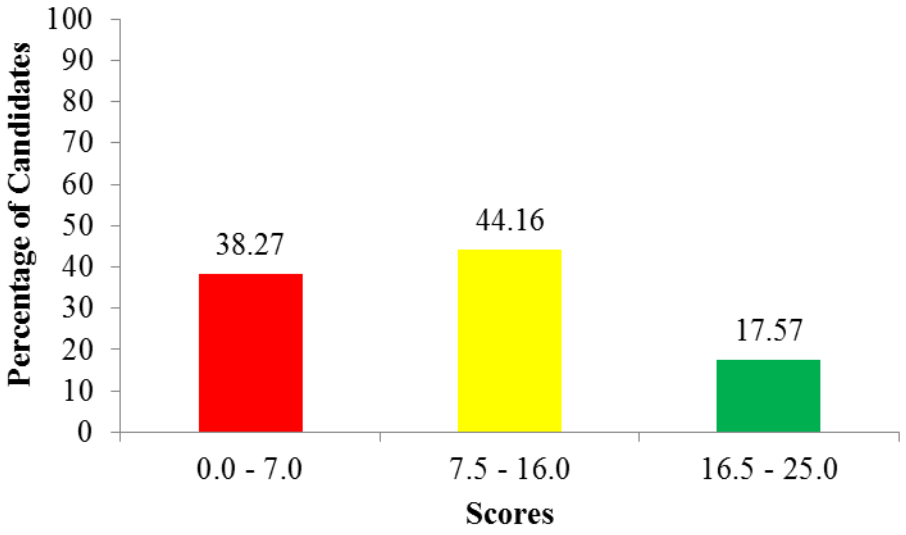


Figure 17: *Candidates' Performance in Question 2*

3.2.1 033/2A Biology 2A

Question 2 in alternative 2A had three parts (a) - (c), carrying a total of 25 marks. The candidates were provided with specimens L (Crab), M (Lizard), N (Maize plant) and P (Mango leaf). Then, they were required to study specimens by using hand lens and answer the following questions:

(a) *Why is it not recommended to place specimens L, M and N in the same kingdom? Give reasons.*

(b) *(i)* *Classify specimen L, M and N to class level.*

(ii) *State two reasons for placing the specimens M and N in their respective classes in (b) (i).*

(iii) *In what ways do members of the class in which specimen L belongs advantageous to other living organisms?*

(c) *Carefully observe specimen P and then answer the following questions:*

(i) *In which Phylum does specimen P was taken? Give reason to support your answer.*

(ii) *Name four organisms which can be placed in the same Phylum or Division of specimen P.*

(iii) *What are the advantages of specimen P in daily life? Give three points.*

Figure 17 indicates that the general performance on question 2 for all alternative papers (A, B and C) was average because 61.73 per cent of the candidates scored from 7.5 to 25 marks. Further analysis shows that the candidates who scored high marks (16.5- 25) had sufficient knowledge about Classification of Living Things. They correctly gave reasons for not placing specimens L, M and N in the same Kingdom. They also demonstrated practical skills in identifying and classifying specimens L, M and N to class level. In addition, they correctly stated reasons for placing the specimens M and N in their respective classes, in (b) (i). Moreover, the candidates correctly stated the ways in which members of the class Crustacea are advantageous to other living organisms, in part (b). Furthermore, the candidates identified the Phylum from which specimen P was taken, they gave reasons and named four organisms which can be placed in the same Phylum or Division of specimen P. Lastly, they correctly gave advantages of specimen P in daily life. Extract 18.1 is a sample of the correct responses to question 2 paper 2A from one of the candidates.

2 (a) (i) specimen N have leaves which contain chlorophyll to manufacture food this make it to be placed in kingdom plantae.

(ii) specimen L and M can locomote since they have locomotory organs hence placed in kingdom Animalia.

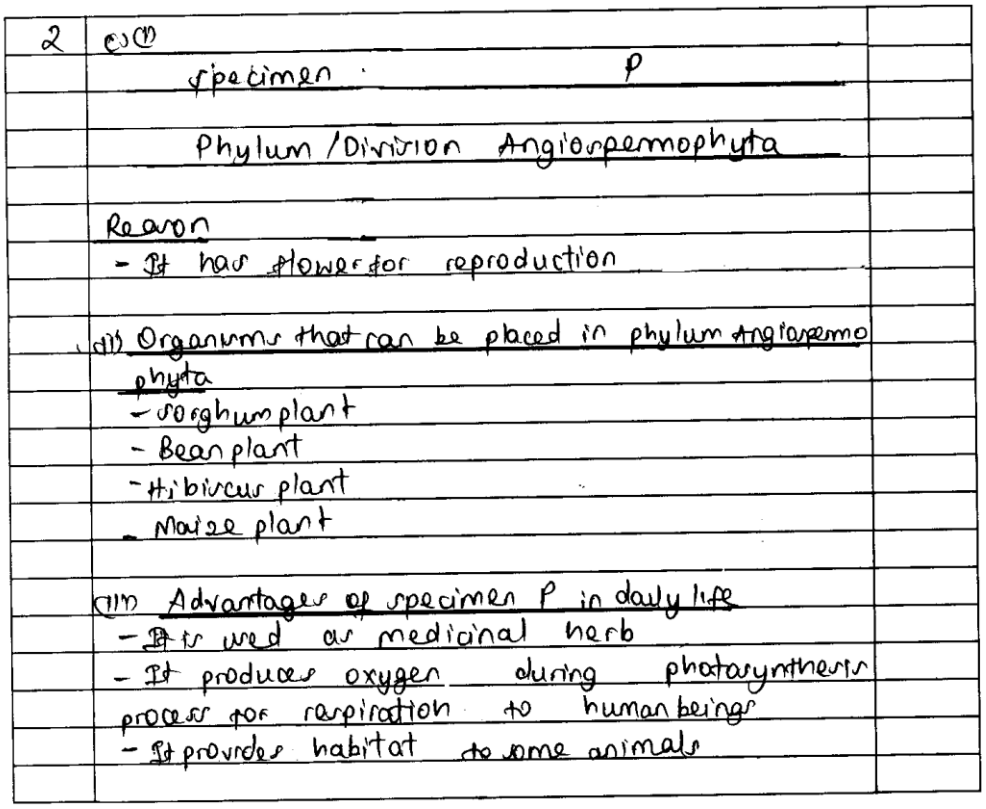
(b) (i)

specimen	L	M	N
Kingdom	Animalia	Animalia	Plantae
Phylum	Arthropoda	chordata	Angiospermophyta
class	crustacea	Reptilia	Monocotyledonae

(ii) specimen M
- It has dry skin with scales.
- It lays eggs with soft shells

specimen N
- It has long and narrow leaves.
- The leaves have parallel veins.

(iii) Advantages of member of class crustacea
- They are used for decoration purpose to human beings.
- They are source of food to some of the animals forexample snakes and other animals.
- They are used in scientific or biological studies and investigations.



Extract 18.1: Candidate's correct response to question 2 papers 2A

In Extract 18.1, the candidate wrote correct responses in all the parts. This shows that the candidate had adequate knowledge about Classification of Living Things.

On the other hand, the candidates who scored average marks (7.5 - 16) obtained most of the marks in parts (a) and (c). However, in part (b), they lost some of the marks because they failed to classify specimens L, M and N to class level.

The candidates who scored low marks (0 - 7) provided incorrect responses to some or most parts of the question. Some of them provided correct responses in some of the question, hence scored from 1 to 7 marks. For the candidates who scored 0 marks, they gave incorrect responses to all parts. For example, in part (a), some of the candidates gave characteristics of living things, such as *can reproduce*, *grow*, *excrete* and *move*. Others explained about their economic importance, such as *source of food* and *used in scientific investigation* instead of giving reasons for placing crab,

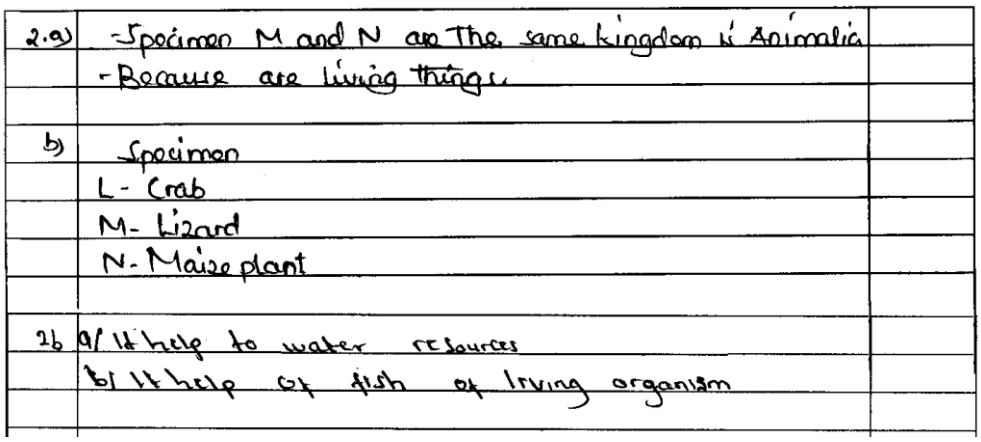
lizard and maize plant to different Kingdom. The incorrect responses indicate that candidates had inadequate knowledge about general and distinctive features of Kingdom Animalia and Plantae.

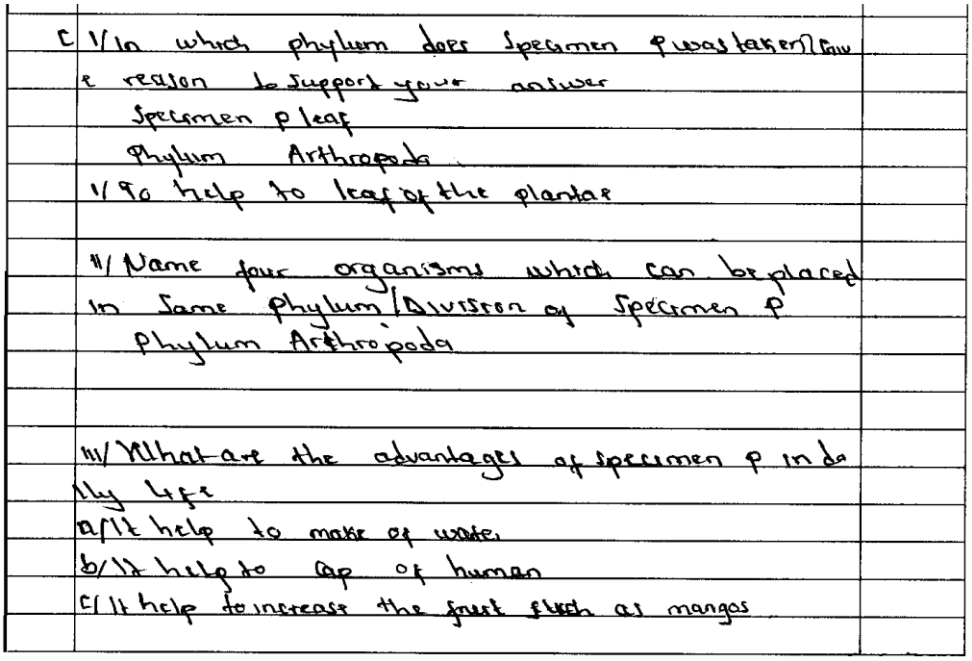
In part (b) (i), the candidates failed to classify the specimens to their respective Kingdom, Phyla/Division and Class, while others misspelt the words. For example, some of the candidates incorrectly classified specimen L to *Kingdom Mammalia* instead of Kingdom Animalia, specimen M to *Kingdom Animal* instead of Kingdom Animalia and specimen N to *Kingdom Plant* instead of Kingdom Plantae. Also the candidates incorrectly classified specimen L to *Phylum Anthropoda* instead of Phylum Arthropoda, specimen M to *Phylum Vertebrate* instead of Phylum Chordata, thus lost marks. Also, some candidates classified specimen L to *Class Insecta* instead of Class Crustacea, specimen M to *Class Amphibia* instead of Class Reptilia, while others classified specimen N to *Class Dicotyledonae* instead of Class Monocotyledonae. Lack of knowledge, practical skills and misspelling of scientific words led them to lose marks.

In part (b) (ii), some of the candidates responded by giving adaptations of specimen to their environment such as *presence of eyes, legs and reproducing by giving birth.* Other candidates drew a diagram of specimen M instead of writing features of Class Reptilia, such as having dry and scaled skin, and laying eggs covered with leathery shell. To specimen N, some of the candidates wrote characteristics of plants, such as *presence of cell wall* and *presence of leaves.* Other candidates drew a diagram of specimen N instead of characteristics of Division Angiospermophyta, such as having flowers and produce fruits. The incorrect responses indicate that the candidates had inadequate knowledge about the distinctive features of various taxa in Classification.

In part (b) (iii), some of the candidates outlined features of Class Crustacea such as *presence of legs, living in water bodies (aquatic)* and *presence of antennae.* Others classified specimen L to Phylum level, such as *Kingdom Animalia* and *Phylum Arthropoda* instead of outlining advantages, such as source of food to human, used as specimen for research studies, and for income through attracting tourists. The incorrect responses indicate that candidates had inadequate knowledge about the advantages of organisms in Class Crustacea.

Similarly, in part (c) (i), some of the candidates failed to identify the phylum/division into which mango leaf belongs. Some candidates stated *Division Dicots*, others stated *Division Monocots* instead of Division Angiospermophyta. Others failed to distinguish between Phylum and Class while others misspelt the division as *Division Angiosperms* instead of Division Angiospermophyta. The incorrect responses indicate that the candidates had inadequate knowledge about grouping organisms into their correct taxonomic ranks. In part (c) (ii), some of the candidates named non flowering plants, such as *moss plant, fern plant* and *pinus* to belong to division Angiospermophyta. Other candidates explained structure of mango leaf such as *it has veins, midrib and margin*, instead of naming any flowering plants such as bean and maize plant. In part (c) (iii), some of the candidates outlined characteristics of specimen P such as *having chlorophyll, having netted veins, having midrib* and *wide lamina.* Others classified specimen P to taxonomic ranks, such as to *Kingdom Plantae* instead of giving advantages such as leaves add humus to the soil, used to make carbohydrate through photosynthesis process, it refreshes air as being a carbon dioxide sink, add oxygen into the atmosphere, and used as medicine. The incorrect responses indicate that candidates had inadequate knowledge about the advantages of Division Angiospermophyta. Extract 18.2 is a sample of the candidates' incorrect responses to question 2 papers 2A.




c i/ In which phylum does specimen P was taken? Give a reason to support your answer
Specimen P leaf
Phylum Arthropoda
i/ To help to leaf of the plantae
ii/ Name four organisms which can be placed in same phylum/Division of specimen P
Phylum Arthropoda
iii/ What are the advantages of specimen P in daily life?
a/ It help to make of water.
b/ It help to eye of human
c/ It help to increase the fruit fleth as mangos

Extract 18.2: Candidate's incorrect response to question 2 paper 2A

In Extract 18.2, the candidate wrote incorrect responses in all parts of the question. For example, the candidate wrote *Phylum Arthropoda* as the Phylum on which specimen P was taken instead of Division Angiospermophyta. Furthermore, he/she wrote *Class Mammalia* instead of Class Crustacea. The responses given in other parts were incorrect as well.

3.2.2 033/2B Biology 2B

Question 2 in alternative 2B had five parts (a) - (e), carrying a total of 25 marks. The candidates were provided with specimens Q (matured moss plant), R (honey bee), S (millipede) and T (crab). Then, they were required to study them and answer the following questions:

(a) (i) Classify each of the specimens R, S and T to class level.
(ii) State three reasons for placing the specimen S to its respective class in 2(a)(i).
(b) Why is it important to understand the type of classification system used to place specimens R, S and T in their respective groups? Give one reason.

(c) State three advantages of the members which have been placed together with specimen R in the same Class.

(d) Why specimen Q is placed in the Division Bryophyta? Give two reasons.

(e) Draw a well labelled diagram of specimen Q.

The candidates who scored high marks (16.5 - 25) had sufficient knowledge about Classification of Living Things. They classified each of the specimens R, S and T to class level, and stated reasons for placing specimens S to its class, in part (a). They also gave correct importance of understanding the type of classification system used to place specimen R, S, and T in their respective groups, in part (b). The candidates also correctly stated advantages of the members placed together with specimen R in class Insecta, and gave reasons for placing specimen Q in the Division Bryophyta, in parts (c) and (d), respectively. In addition, they demonstrated good drawing skills as they drew a well labelled diagram of specimen Q. These responses imply that the candidates had adequate knowledge about identifying and classifying various organisms. Extract 19.1 is a sample of the correct response to question 2 paper 2B from one of the candidates.

2. (a) (i) Specimen R: Bee
Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta

Specimen S: Millipede
Kingdom: Animalia
Phylum: Arthropoda
Class: Diplopoda

Specimen T: Crab
Kingdom: Animalia
Phylum: Arthropoda
Class: Crustacea

(ii) Reasons for placing specimen S to its respective class:
- It has numerous segments
- It has two pairs of legs per each segment.
- It has cylindrical body shape

(b) It is more accurate since it also considers internal and external features of the specimens during their classification.

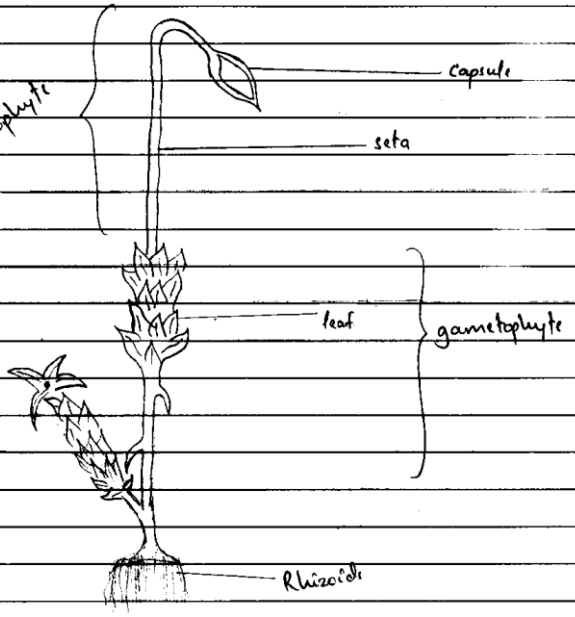
(c) Advantages of members of class of specimen R:
(i) They act as source of food to other organisms. For example grasshopper.
(ii) They are agents of pollination example Bee, therefore aid in agricultural sector.

(iii) Insects like Bee produce honey which can be used for
1. food and medicine.

(d) Why specimen Q is placed in division Bryophyta?
(i) The gametophyte generation is dominant over sporophyte
(ii) They do not have true leaves stems and roots

DIAGRAM OF SPECIMEN Q (MOSS PLANT)

(e)



Extract 19.1: Candidate's correct response to question 2 paper 2B

In Extract 19.1, the candidate wrote correct responses in all parts of the question, indicating that he/she had adequate knowledge about identifying and classifying various organisms.

On the other hand, the candidates who scored average marks (7.5 - 16) obtained most of the marks in parts (a), (c), (d), and (e). However, in part (b), they lost some of the marks because they failed to classify specimens R, S and T to class level.

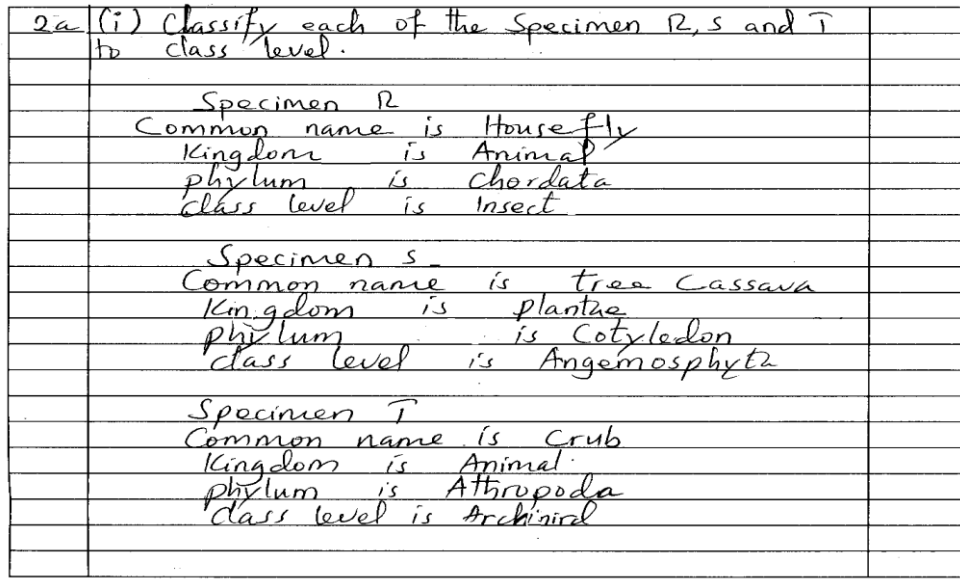
The candidates who scored low marks (0 - 7) provided incorrect responses to some or most parts of the question. Some of them provided correct responses in some of the question, hence scored from 1 to 7 marks. For the candidates who scored 0 marks, they wrote incorrect responses in all parts. In part (a) (i), some of the candidates failed to classify the specimens to their respective Kingdom, Phyla and Class. For example, some of them classified specimen R to *Kingdom Insects,* instead of Kingdom Animalia, specimen S to *Phylum Annelida* instead of Phylum Arthropoda, specimen T to *Class Insectary* instead of Class Crustacea. Others incorrectly mentioned the Kingdom, Phylum, and Class in which the specimen belongs without following the hierarchical order which starts from the highest rank, Kingdom to the lowest rank, Class hence lost some marks. Also, there were other candidates who mentioned correct ranks, but misspelt them, thus loss of marks as well. The incorrect responses indicate that the candidates had inadequate knowledge about ranks and skills of classifying organisms. In part (a) (ii), the candidates were required to state three reasons for placing the specimen S to its respective Class. Majority of the candidates responded correctly in this part. This indicates that the candidates had adequate knowledge about distinctive features of Class Diplopoda. However, a few candidates responded incorrectly by stating *presence of legs, presence of tail* and *presence of eyes* instead of distinctive features, such as two pairs of jointed legs per segment, presence of numerous segments and round body.

In part (b), some of the candidates gave disadvantages of artificial system of classification, such as *it is cheap, it requires skilled people* and *can be done by any person*. Other candidates gave features of Kingdom Animalia, such as *they reproduce sexually, have nerve and endocrine system* and *they store food in a form of glycogen* instead of advantages of natural classification system, such as it is more accurate and involves scientific investigation. The incorrect responses indicate that the candidates had general knowledge about systems of classification, but had inadequate knowledge specifically on natural system of classification.

In part (c), some of the candidates incorrectly stated characteristics of organisms in Class Insecta, such as *they have wings*, *they possess antennae*, and *they possess exoskeleton*. Others drew a diagram of specimen R instead of its advantages, such as some of them are source of food, pollinators and attraction of tourist. The incorrect responses indicate that candidates had inadequate knowledge about the advantages of Class Insecta.

In part (d), some of the candidates gave general characteristics of plants such as *they have cell wall*, *they have chlorophyll*, *and they have roots*. Others wrote about uses of specimen Q, such as used as *shelter to microorganisms* and *source of oxygen* instead of stating characteristics of Division Bryophyta, such as lack of vascular tissues, and lack true roots, stem and leaves. The incorrect responses indicate that the candidates had general knowledge about features of all plants, but had inadequate knowledge about distinctive features of Division Bryophyta.

In part (e), some of the candidates drew the diagram of specimen Q with incorrect labelling, while others incorrectly drew a diagram of fern plant instead of matured moss plant. Also, some of them drew the diagram of specimen Q without labelling, which led to loss of marks. The incorrect responses indicate that the candidates had inadequate knowledge about the structures of representative organism in Division Bryophyta. Extract 19.2 is a sample of the candidates' incorrect responses to question 2 paper 2B.


2a (i) Classify each of the Specimen R, S and T to class level.

Specimen R
Common name is Housefly
Kingdom is Animal
phylum is Chordata
class level is Insect

Specimen S
Common name is tree Cassava
Kingdom is plantae
phylum is Cotyledon
class level is Angemosphyta

Specimen T
Common name is Crab
Kingdom is Animal
phylum is Athropoda
class level is Archinid

(ii) three reasons for placing the Specimen S Its respective class in 2(a)(i)

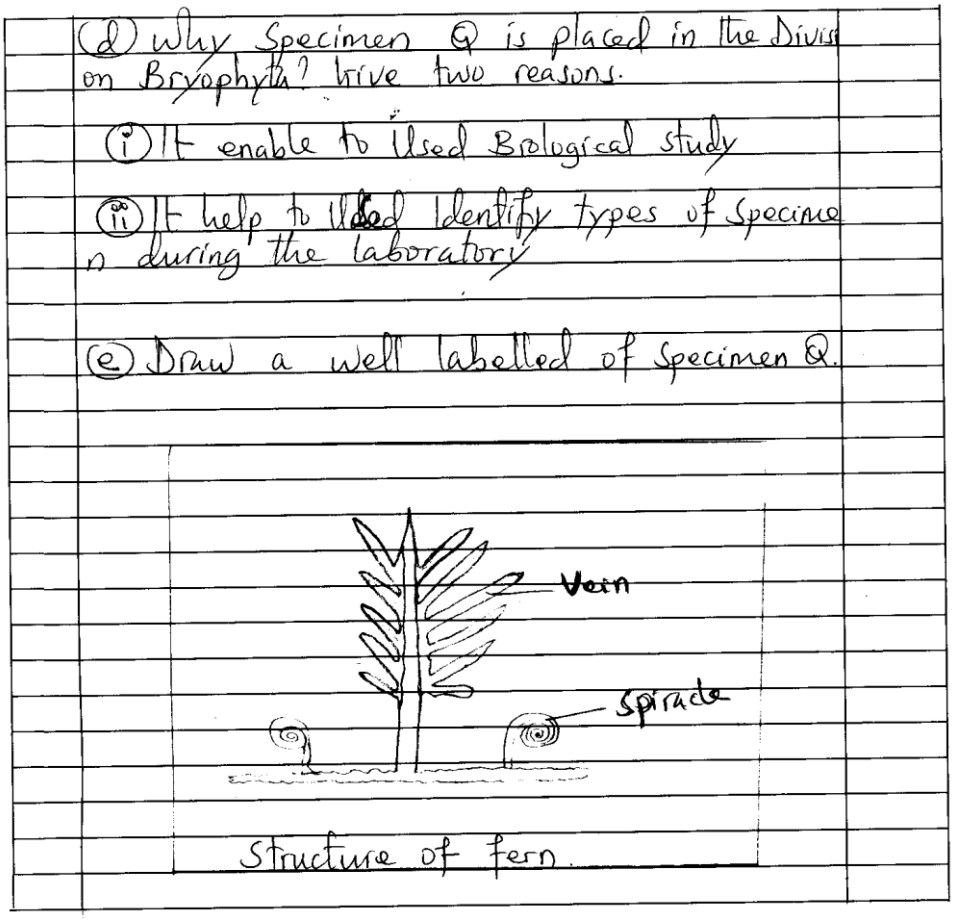
(i) It take large position in the laboratory
(ii) It enable to Used Biological study
(iii) To Identify Used and doing practical ~~To~~ Sprifly work during the experiment.

(b) Why is It Important for scientist to Under Stand the type of classification System Used to place Specimen R, S and T in their groups Write one reason.

(i) Because of Specimen R, S, and T Is Used in labourtory during the prepere and Biological study

(c) State three advantages of the members which have been placed together with Specimen R in the Same class.

three advantage.
(i) It enable to fertilizer of flower
(ii) It enable biological laboratory during the prepere experment.
(iii) It help to work



Extract 19.2: Candidate's incorrect response to question 2 paper 2B

In Extract 19.2, the candidate wrote incorrect responses in all parts of the question. For example, in part (a), the candidate classified specimen R to *Kingdom Animal, Phylum Chordata and Class Insect* instead of Kingdom Animalia, Phylum Arthropoda and Class Insecta. He/she wrote reason for placing specimen S to its respective class as it *takes large position in the laboratory* instead of having two pairs of jointed legs per segment. He/she drew fern plant instead of moss plant. Also, the responses given in other parts were incorrect.

3.2.3 033/2C Biology 2C

Question 2 in alternative 2C had six parts (a) - (f), carrying a total of 25 marks. The candidates were provided with specimens D (matured fern

plant), F (matured moss plant), and G (honey bee). Then, they were required to study them carefully and answer the following questions:

(a) Classify each of the specimens D, F and G to Class level.

(b) Why specimen D and F were placed in the same Kingdom but different Division?

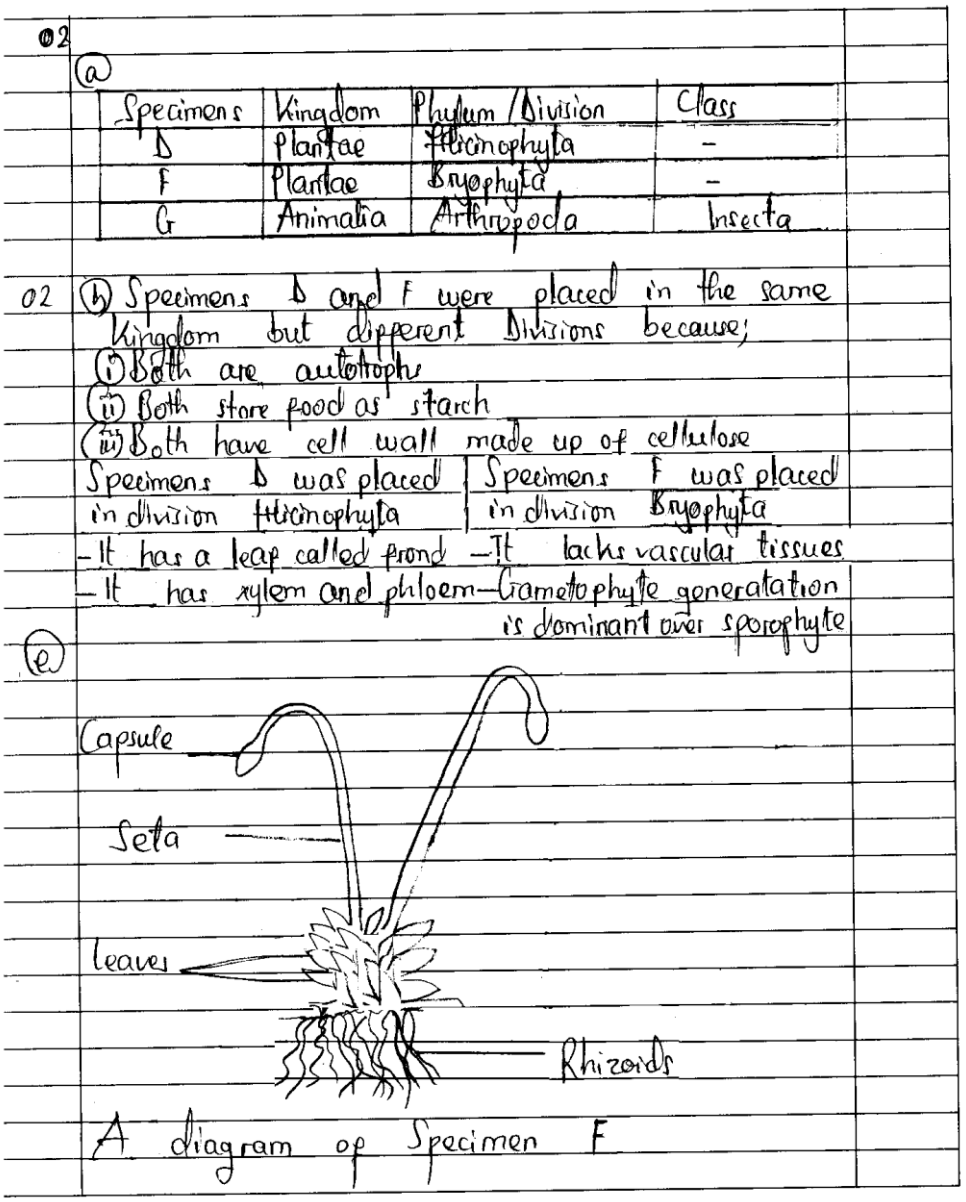
(c) Why is it important for scientist to use natural classification system to classify the specimen D and F?

(d) What would be the disadvantages for scientist to use artificial classification system to classify specimen D and F.

(e) Draw a well labelled diagram of specimen F.

(f) In what way are the products from specimen G useful for industrial development? Give two points.

The candidates who scored high marks (16.5 - 25) had practical skills in identification and classification of various organisms. Therefore, they correctly classified specimens D, F, and G to class level by starting from the highest rank Kingdom to the lowest class in part (a). Also, they gave correct reasons for placing specimens D and F in the same kingdom, but different division, in part (b). In addition, they explained correctly the importance of using natural classification system to classify the specimens D and F, in part (c). They gave the disadvantages for scientist to use artificial classification system to classify specimens D and F, in part (d). The candidates moreover were skilful in drawing as well. Thus, they drew a well labelled diagram of specimen F, and gave correct ways in which the products from specimen G are useful for industrial development, in parts (e) and (f). Extract 20.1 is a sample of candidates' correct responses in question 2 paper 2C.



Extract 20.1: Candidate's correct responses to question 2 parts (a), (b) and (e) paper 2C

In Extract 20.1, the candidate wrote correct responses, signifying that, the candidate was competent in identifying and classifying various organisms to their taxonomic groups.

The candidates who scored average marks (7.5 - 16) obtained most of the marks in parts (b), (d), (e) and (f). However, they lost some marks in parts (a) and (c) because they failed to classify specimens D, F, and G to class level. Also, they gave incorrect importance for scientist to use natural classification system to classify the specimens D and F.

On the other hand, the candidates who scored from 0 to 7 marks wrote incorrect responses in all or some parts of the question. For instance, in part (a) some of the candidates wrote incorrect responses, and others wrote correct ranks but misspelt them. Misspelt words are specimen D to *Kingdom Plant* instead of Kingdom Plantae. Incorrect responses are such as *Division Coniferophyta* and Division Angiospermophyta. In specimen F, candidates classified it into *Kingdom Fungi* and *Division Pteridophyta* instead of Kingdom Plantae and Division Bryophyta. While other candidates classified specimen G to *Kingdom Annamalia*, *Phylum Athropoda* and *Class Insects* instead of Kingdom Animalia, Phylum Arthropoda and Class Insecta. The incorrect responses indicate that the candidates had inadequate understanding on grouping organisms into their respective ranks.

In part (b), some of the candidates wrote features of Division Angiospermophyta, such as *having flowers, produce fruits and seeds* as reasons for placing specimens D and F, to the same Kingdom. Other candidates wrote uses of specimens D and F such as *prevent soil erosion*, *source of food and shelter to other living organisms* instead of writing reasons based on distinctive features of kingdom plantae, such as both have cellulose cell wall and both have autotrophic nutrition. Also some candidates incorrectly stated the reasons for placing specimen D to its Division Filicinophyta, such as *lack of vascular tissue, presence of rhizoids* and *gametophyte generation to be dominant over sporophyte generation* instead of have xylem and phloem, and have leaf like structures called fronds. In addition, some of the candidates classified specimen F to *Division Filicinophyta* due to reasons such as *presence of sori, presence of fronds* and *presence of fiddle head* instead of giving reasons based on features, such as lack of xylem and phloem and having leaf like structure called thallus. These incorrect responses suggest that, the candidates had inadequate knowledge about distinctive features of Kingdom Plantae at all levels.

In part (c), some of the candidates responded by explaining the advantages of artificial Classification system, such as *the system requires few features in classifying organisms, it saves time and it is cheap.* Other candidates explained rules of binomial nomenclature, such as *a scientific name should have two parts* and *the name should be in Latin language* instead of writing importance, such as require more than one feature and make stability of identification of the organisms easier. The incorrect responses indicate that the candidates had inadequate understanding on the advantages of natural Classification system.

In part (d), some of the candidates stated disadvantages of natural classification system, such as *it is expensive, consumes time and it is unstable.* Also, other candidates stated advantages of artificial classification system, such as it *is cheap, it saves time* and *it can be conducted by any person* instead of disadvantages of artificial classification, such as use of few observable features which may place the specimens in the wrong taxon, it lead into confusion and difficult in identification of organisms among scientists. The incorrect responses indicate that the candidates had inadequate knowledge about disadvantages of artificial classification system.

In part (e), some of the candidates incorrectly drew a diagram of matured fern plant, while others drew maize plant. Other candidates drew diagrams which were not part of the question such as mucor instead of a diagram of matured moss plant. In part (f), some of the candidates did not understand the question demand, as a result, they incorrectly stated characteristics of specimen G, such as *presence of legs, wings* and *eyes* while others wrote disadvantages of specimen G, such as *cause illness to people* instead of uses of its product, such as honey bee produce honey which can be used as medicine and in cosmetic processing industries. Also, honey bee produces wax used to make candle. The incorrect responses indicate that the candidates had inadequate knowledge about advantages of the members of Class Insecta. Extract 20.2 is a sample of the candidate's incorrect responses to question 2 paper 2C.

2a

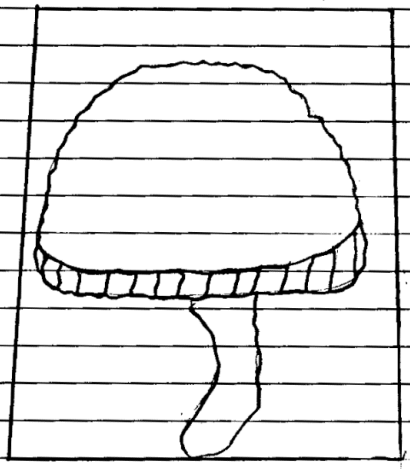
Specimen	Class level
D	insecter
F	insecter
G	insecter

b Because the Specimens D and F are plant.

c. Specimens D
It used of research.
It used of biological experimant.
Specimens F
It used of biological experimant.
It used of Classification System.

d. The Specimens D it disadvantage of the human being.
The Specimen F it disadvantage of the house.

e



THE DIAGRAM OF MASHROOM

Extract 20.2: Candidate's incorrect response to question 2 paper 2C

In Extract 20.2, the candidate wrote incorrect responses in all parts of the question. For example, in part (a), the candidate wrote *Class Insecter* for specimen G instead of Class Insecta. In part (e), the candidate drew diagram that looks like *mushroom* instead of matured moss plant. Also, the responses given in other parts were incorrect.

4.0 ANALYSIS OF CANDIDATES' PERFORMANCE IN EACH TOPIC

A total of 17 topics were tested in the Biology subject examination papers 1 and 2. The analysis of the candidates' performance on the paper 1 indicates that out of 17 topics tested, the topic of *Introduction to Biology* had the highest performance of 85.20 per cent, which was examined in question 2. It was followed by the topics tested in question 1, which were *Coordination, Safety in our environment, Excretion, Genetics, Growth, Evolution, Transport of Materials in Living Things, Classification of Living Things, Movement* and *Cell structure and organisation.* These topics had the performance of 82.07 per cent. These topics were followed by *the topic of Safety in Our Environment* (69.82%) and *Classification of Living Things* (66.22%), which were examined in questions 4, 15, and question 2 practical.

The topics with average performance were *Movement* (50.44%), *Healthy and Immunity* (45.77%), *Genetics* (39.96%), *Reproduction* (39.25%) and *Transport of Materials in Living Things* (35.77%). These topics were examined in questions 3, 6, 12, 13, 11, and question 1 practical, respectively.

The topics with weak performance were *Nutrition* (26.55%), *Regulation* (24.69%), *Gaseous Exchange and Respiration* (17.14%), *Balance of Nature* (16.62%), *Excretion* (16.16%) and *Coordination* (1.73%). These topics were examined in questions 14, 8, 9, 7, 5, 10, respectively. Appendix I summarizes the candidates' performance on each topic in 033/1 Biology 1 and 033/2 Biology 2, CSEE 2022.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Analysis of the candidates' performance in the Biology CSEE 2022 was good because 67.84 per cent of them scored from 30 marks and above. Further the analysis of the candidates' performance in paper 1 revealed that the candidates had good performance on questions 1, 2, 4 and 15. The questions with average performance were 3, 6, 11 and 12. On the other hand, the candidates had weak performance on questions 5, 7, 8, 9, 10, 13 and 14. 033/2 Biology 2 had only two questions (questions 1 and 2) and both had an average performance.

The good performance in some topics was contributed by adequate knowledge about the assessed topics, candidates' ability to understand the demands of the questions, adequate drawing skills and good mastery of the English language. It was established that, factors such as lack of adequate knowledge in the respective topics, provision of responses which were contrary to the task of the question, lack of adequate drawing skills and poor proficiency in the English language contributed to weak performance.

5.2 Recommendations

Based on the findings from the Candidates' Item Response Analysis (CIRA), it is recommended that, teachers should:

(a) use hot and sharp objects, charts/drawings or pictures to guide students during discussion about the ways in which coordination is brought about for teaching and learning of the topic of *Coordination*.

(b) dissect a small mammal to display the urinary system for students to observe and identify the structures of the urinary system for teaching and learning of the topic of *Excretion*. Also, guide the students in a discussion about the structure of urinary system and its adaptive features.

(c) use charts/photographs showing various living things in their natural environment to guide students in a discussion about how living organisms interact among themselves for teaching and learning of the topic of *Balance of Nature.*

(d) guide students to brainstorm on the meaning and importance of gaseous exchange. Also, use different organisms, such as insects, fish, amphibians and small mammals, variety of leaves and hand lens to guide them in examining sites of gaseous exchange for teaching and learning of the topic of *Gaseous Exchange and Respiration.*

(e) assign tasks to students in groups to read literatures, use video tapes, charts, and pictures to identify the causes, symptoms and effects of high and low sugar levels in the blood for teaching and learning of the topic of *Regulation*.

(f) use chart/drawings on photosynthesis process, variety of plants and variety of storage organs of plants to guide students to explain the importance of photosynthesis in the real life situation for the teaching and learning of the topic of *Nutrition*.

(g) emphasize students to read questions carefully before answering them in order to understand their demands and answer them accordingly.

(h) encourage students to use English language in their day to day communication. This will improve their proficiency in the English language and enable them to understand what is taught in the classrooms as well as the questions' demand.

(i) give more exercises on drawing and labelling in order to develop students' drawing skills of biological diagrams.

Appendix: A summary of the Candidates' Performance Topic-wise in CSEE 2022

S/N	Topic	CSEE 2022			
		Question number	Percentage of Candidates With a Score of 30% or Above	Average Performance Per Topic (%)	Remarks
1.	Introduction to Biology	2	85.20	85.20	Good
2.	Coordination, Safety in Our Environment, Excretion, Genetics, Growth, Evolution, Transport of Materials in Living Things, Classification of Living Things, Movement and Cell structure and Organisation	1	82.07	82.07	Good
3.	Safety in Our Environment	4	69.82	69.82	Good
4.	Classification of Living Things	15	70.70	66.22	Good
		2 Practical	61.73		
5.	Movement	3	50.44	50.44	Average
6.	Healthy and Immunity	6	45.77	45.77	Average
7.	Genetics	12	39.96	39.96	Average
8.	Reproduction	13	24.58	39.25	Average
		1 Practical	53.92		
9.	Transport of Materials in Living Things	11	35.77	35.77	Average
10.	Nutrition	14	26.55	26.55	Weak
11.	Regulation	8	24.69	24.69	Weak
12.	Gaseous Exchange and Respiration	9	17.14	17.14	Weak
13.	Balance of Nature	7	16.62	16.62	Weak
14.	Excretion	5	16.16	16.16	Weak
15.	Coordination	10	1.73	1.73	Weak