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

CANDIDATES' ITEM RESPONSE ANALYSIS REPORT FOR THE PRIMARY SCHOOL LEAVING EXAMINATION (PSLE) 2022

SCIENCE AND TECHNOLOGY

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05E SCIENCE AND TECHNOLOGY

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FOREWORD

The Primary School Leaving Examination (PSLE) 2022 in the Science and Technology subject was based on evaluating candidates' competence in the Science and Technology. The Examination assessed the efficiency on executing the 2016 Science and Technology syllabus for Basic Education Standard III – VII.

The purpose of this analysis was to provide feedback to teachers, policy makers, curriculum developers and other education stakeholders on how the candidates responded to the questions they attempted. This is important as the excellence of the candidates' responses is among the indicators of whether the candidates were able or not able to learn effectively in Science and Technology subject.

The analysis shows that candidates with good performance were competent and had adequate knowledge about the assessed concepts. Candidates who failed to respond correctly to question some of them lacked competence on the measured concepts, there are those who misunderstood the demand of the questions and therefore failed to understand the question demand.

The Examinations Council of Tanzania expects that the feedback given through this report will enable education stakeholders to see the trend of education in the primary education in Tanzania particularly in the Science and Technology subject. Moreover, the insights obtained from this report will enable education stakeholders to identify appropriate measures that ought to be taken in order to improve the teaching and learning process.

The National Examinations Council of Tanzania would like to express sincere gratitude to Examination Officers and all others who participated in the preparation of this report in various stages.

Dr. Said A. Mohamed
EXECUTIVE SECRETARY

1.0 INTRODUCTION

The Primary School Leaving Examination (PSLE) in the Science and Technology subject for a year 2022 aimed at measuring the candidates' competence stipulated in the 2016 Science and Technology syllabus for Basic Education Standard III - VII and were set as per 2020 examination format. The number of candidates registered were 1,384,186. Out of whom, 1,350,794 (97.56%) sat for the examination. Analysis of the candidates' performance in the Science and Technology subject examination shows that 965,600 (71.63%) candidates passed the examination.

This report presents the data and descriptions regarding the candidates' standard performance of candidates per question and by competences. The questions analysed are divided into sections A and B. The analysis of candidates' responses in section A was made according to their alternatives: A, B, C, D and E. Possible reasons for candidates' choices are given for each question. The letter of the correct answer is marked with a star (*) in tables and charts to differentiate it with other options. Furthermore, the percentage of candidates who failed to follow instructions on how to answer the questions and those who could not write anything has been included in the analysis under the heading **"others"** as indicated in the respective tables and charts of this report.

The analysis of the candidates' responses in section B was based on the qualities of responses and performance on particular questions. Extracts of good and poor responses of the candidates have been used to show the ability of the candidates in responding to different questions. The statistics which show candidates' performance on each question are presented using tables and charts.

Overall, the report has five sections, namely the introduction, the analysis of the candidates' responses to each question, analysis of the candidates' performance in each topic, and finally the conclusion and recommendations are given. The summary of performance per competence is shown in the Appendix at the far

end of this report. The grouping of the candidates' performance is categorized as good, average and poor based on the following percentage ranges: 60 – 100 = Good, 40 – 59 = Average and 0 – 39 = Poor.

2.0 ANALYSIS OF THE CANDIDATES' RESPONSES FOR EACH QUESTION

This part of the report analyses candidates' performance in section A and B. In the analysis, the requirements of each question, reason for the candidates' response in each option and statistics of performance on each question has been shown.

2.1 SECTION A: Multiple Choice Items

This section consisted of 40 questions. The candidate was required to choose the correct answer and to shade its corresponding letter in a special answer sheet (OMR) that was provided. The analysis of the candidates' responses in this section is as follows:

Question 1: Human blood circulatory system is made up of three parts. What are those parts?

A Blood, heart and blood vessels.
B Plasma, blood and blood vessels.
C Platelets, heart and red blood cells.
D Tissue, heart and white blood cells.
E Plasma, tissue and platelets.

The question assessed candidates' competence in identifying parts of the human blood circulatory system. The question was attempted by 1,350,794 candidates. The analysis indicates that 856,304 (63.39%) candidates responded correctly and 480,678 (35.58%) failed. Figure 1 shows the dispersion of candidates' responses and percentage of candidates for each option on question 1.

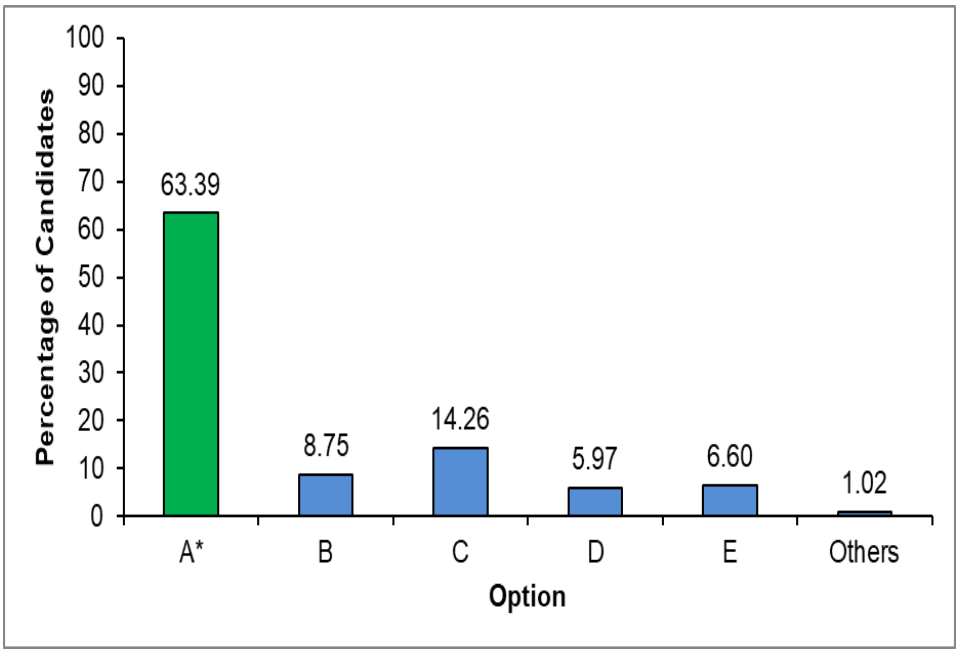


Figure 1: *The percentages of candidates for each option*

Figure 1 shows that 63.39 per cent of the candidates attempted the question correctly by choosing A, *Blood, heart and blood vessels* The general performance of the question was good. The candidates who answered correctly understood that blood, heart and blood vessels are the major parts of human blood circulatory system.

Nevertheless, 35.58 per cent of the candidates failed. This indicates that the candidates lacked enough competence in identifying the parts of human blood circulatory system. For example, those who chose alternatives B, C, D and E lacked knowledge that plasma, red blood cells, platelets and white blood cells are the components of blood and not the blood circulatory system. Likewise, in alternatives D and E did not understand that tissue is a group of similar cells that work together to perform the same function to bring efficiency.

Question 2: A lorry driver got an accident which caused his body to lose the ability to balance. What part of his ear was affected?

A Hammer B Semicircular canal C Anvil
D Stirrup E Meatus.

This question assessed candidates' competence in identifying parts of the ear and their respective functions. The question was attempted by 1,350,794 candidates. Analysis indicates that 579,787 (42.92%) candidates responded correctly and 752,870 (55.74%) failed. Figure 2 shows candidates' percentage for each option.

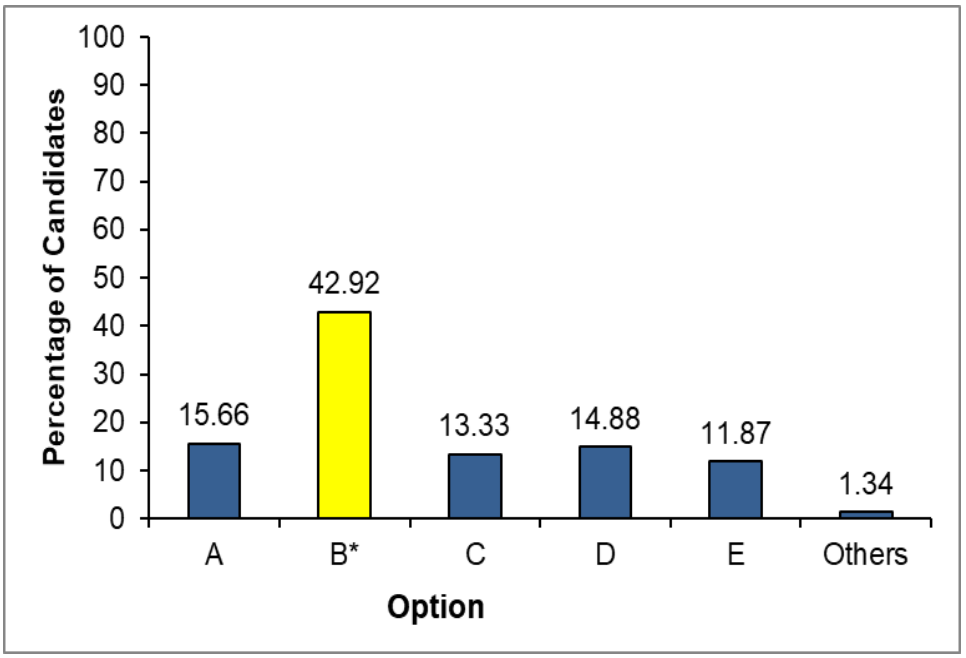


Figure 2: *The percentages of candidates for each option*

Figure 2 shows that 55.74 per cent of the candidates failed the question by selecting incorrect responses. These candidates lacked competence in identifying parts of the ear with their respective functions. These candidates opted for alternatives A, C, D and E. For example, candidates who opted for alternative A, *Hammer*; C, *Anvil* and D, *Stirrup* lacked an understanding that ear ossicles receive sound wave vibrations and direct them to the inner ear. Moreover, those who chose E, *Meatus* did not know that the role of meatus is to direct and transfer the sound wave vibrations to the middle ear.

On the other hand, 42.92 per cent of the candidates who selected the correct response B, *Semi-secular canals.* These candidates had

sufficient knowledge about human nervous system particularly parts of ear and their functions.

Question 3: Mr. Chapombe was nicknamed of his habit of excessive drinking of alcohol. Which organ is likely to be affected due to this habit?"

A Liver B Kidney C Lungs
D Heart E Brain.

The question assessed candidates' competence in recognizing the organ that removes toxins from the body. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 396,120 (29.32%) responded correctly and 935,291 (69.24%) failed. The general performance on the question was weak. Table 1 shows dispersion of candidates' response and their percentage for each option.

Option	A*	B	C	D	E	Others
No. of candidates	396120	275962	341404	61047	256878	19,383
% of Candidates	29.32	20.43	25.27	4.52	19.02	1.43

Table 1: *The percentage of candidates in each option*

Table 1 indicates that 69.24 per cent of the candidates who failed to choose the correct answer opted for distractors B, C, D and E. These candidates did not understand the role of the liver. Candidates who opted for alternative B, *Kidney* failed to comprehend that the kidney is used to filter blood to make urine. Those who chose *C, Lungs* did not recognize that the role of the lungs is to allow oxygen into the blood and remove carbon dioxide from blood. Additionally, the candidates who opted for D, *Heart* failed to understand that the role of the heart is to pump blood to all parts of the body. On the other hand, candidates who chose distractor E, *Brain* failed to realise that the role of the brain is to coordinate various voluntary and involuntary actions including learning, speaking, breathing and thinking.

Further analysis shows that 29.32 percentage of the candidates chose the correct option. These candidates were knowledgeable

enough to understand that the role of the liver, is to remove toxins from the body.

Question 4: What will happen if a person gets an accident and his testes are severely damaged?"

A Male gametes will not enter the vagina.
B Male gametes will not be produced.
C Male gametes will not be transported to the urethra.
D Male gametes and urine will not be produced.
E Male gametes will be produced and die.

This question assessed the candidates' competence in recognizing the function of different parts of the male reproductive system. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance shows that 682,117 (50.50%) responded correctly and 651,672 (48.25%) failed. Figure 3 shows the dispersion of candidates' responses and the percentage for each option.

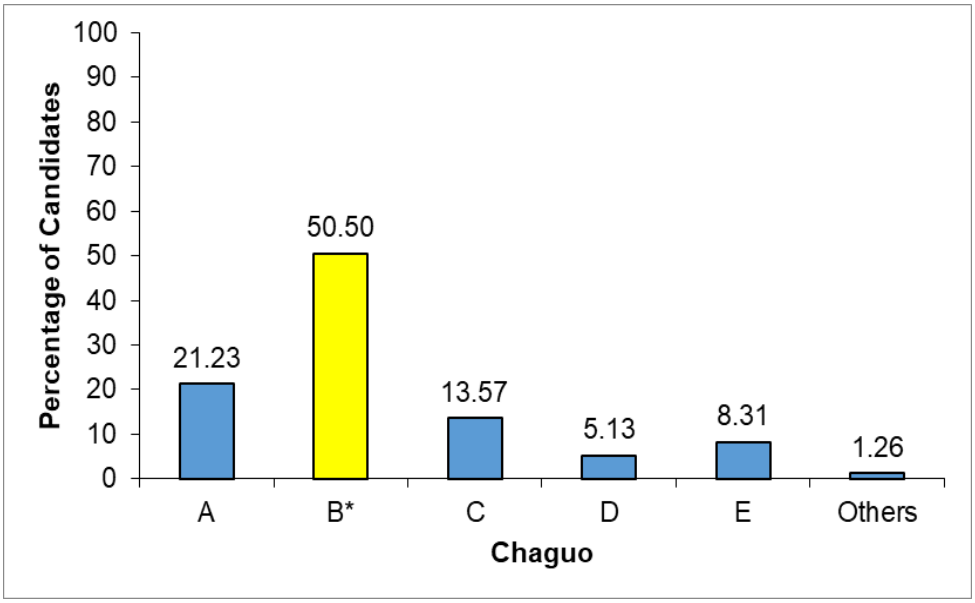


Figure 3: *The percentage of candidates in each option*

Figure 3 reveals that 50.50 percent of the candidates attempted this question by choosing the correct alternative B *male gametes will not be produced*. These candidates understood that testes are responsible for the production and storage of male gametes. Thus, if

testes were severely damaged the male gametes will not be produced.

However, 651,672 (48.25%) candidates failed to choose the correct answer opted for alternatives A, C, D and E. These candidates did not understand the function of testes. For example, the candidates who opted for A, *Male gametes will not enter the vagina* were not aware that it is the penis that is responsible for the transportation of male gametes from testes to the vagina. Those who opted for C, *Male gametes will not be transported to the urethra* did not recognize that vas deferens transports male gametes to the urethra. In addition, those who chose distractor D, *Male gametes and urine will not be produced* failed to understand that urine is produced in kidney and not in the testes. Candidates who opted for E, *Male gametes will be produced and die* failed to understand that there will be no production of male gametes because the testes were severely damaged in accident.

Question 5: Study Figure 1 which shows eye defects and then answer the question that follows.

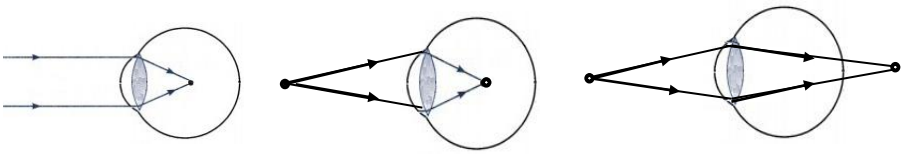


Figure 1

Which defect is corrected by the convex lens?

A (i)
B (ii)
C (iii)
D (i) and (ii)
E (ii) and (iii).

The question assessed the candidates' competence in identifying eye defects based on the image formed in front or behind the retina and recognize its correction using lens. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 460,065 (34.06%) responded correctly and 868,771

(64.32%) failed to respond correctly to the question. Table 2 shows the dispersion of candidates' answers and the percentage for each in option question 5.

Option	A	B	C*	D	E	Others
No. of candidates	303759	329616	460065	118153	117243	21,958
% of candidates	22.49	24.40	34.06	8.75	8.68	1.63

Table 2: *Candidates' percentage for each option*

Table 2 shows that the correct answer for this question was C; *(iii).* 64.32 percentage of candidates who failed to choose the correct answer and thus made the performance on the question to be weak. Those candidates who opted for either of the distractors A, B, D or E lacked adequate knowledge about eye defects (short sightedness and long sightedness). Candidates who opted for A, *(i);* B, *(ii);* D, *(i) and (ii);* E (ii) *and (iii)* did not realise that light rays converge in front of the retina (short sightedness) and this defect is corrected by concave lens which diverts the light rays and makes it converge on the retina

On the contrary, 34.06 percent of the candidates chose the correct response; these candidates had adequate knowledge on the image formed behind the retina (hypermetropia) is corrected by convex lens.

Question 6: Why plant cells have the ability to make their own food while animal cells lack that ability?

A Plant cell has cytoplasm
B Plant cell has stomata
C Plant cell has nucleus
D Plant cell has mitochondria
E Plant cell has chloroplast.

The question assessed candidates' competence in identifying the function of various parts of the plant cell. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 299,101 (22.14%) responded correctly and 1,032,427 (76.43%) failed. Figure 4 shows the dispersion of candidates' answers and their percentages for each option on question 6.

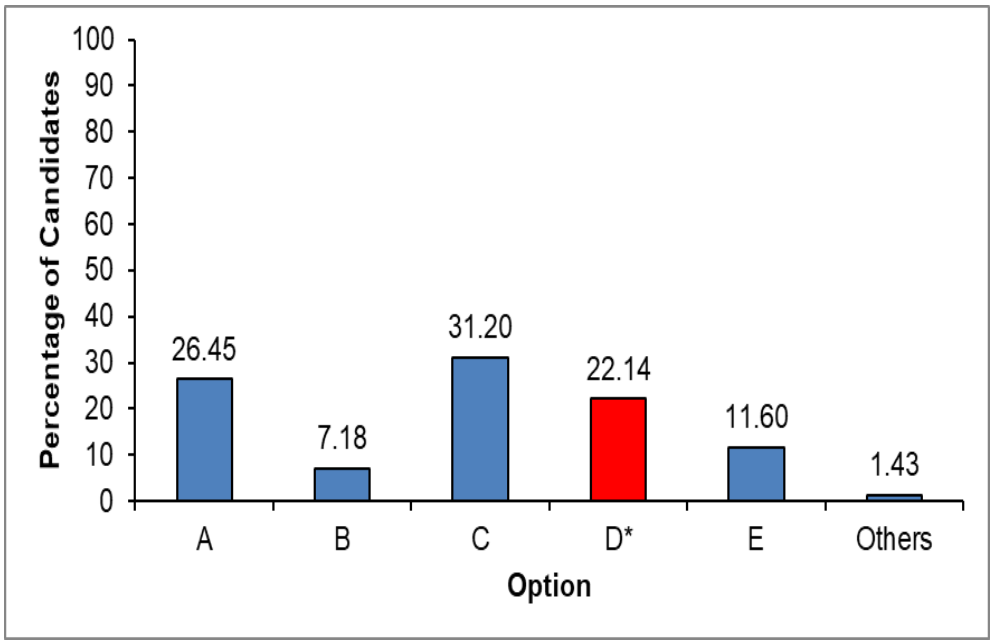


Figure 4:*Candidates' percentage for each option*

Data from Figure 4 reveals that the correct answer for this question was D, *Plant cell has chloroplast*. 67.47 per cent of the candidates failed to choose the correct answer causing the general performance of the question be weak.

The candidates who opted for incorrect responses A, B, C and E. These candidates had insufficient understanding on the role of chloroplast. For example, candidates who opted for A, *Plant cell has cytoplasm* did not understand that cytoplasm is the site for chemical reactions in the cell. Those who opted for B, *Plant cell has mitochondria* were not aware that mitochondria provide the site for energy production in the cell. Those who chose alternative C, *Plant cell has stomata* had inadequate knowledge about the function of stomata which is to allow gaseous exchange in the plant. Candidates who opted for alternative E, *Plant cell has nucleus* did not realise that nucleus coordinates and controls all activities of the cell.

On the other hand, statistics show that 22.14 percent of the candidates chose the correct alternative. These candidates had adequate

knowledge of the role of chloroplast that it contains green pigment (chlorophyll) responsible for absorption of sunlight energy which is used for manufacturing their own food (photosynthesis).

Question 7: When you fill the air in a balloon its volume increases but if air exceeds it bursts. What is the scientific meaning of the increase in size of the balloon?

A Air occupies space.
B Air is heavier than a balloon.
C Air consist of tiny particles.
D The balloon is so smooth.
E The balloon is elastic.

The question assessed the candidates' competence in identifying the properties of matter. Data shows that the performance on this question was good as 881,419 (65.25%) candidates chose the correct answer. On the other hand, 453,547 (33.58%) responded incorrectly to the question. The dispersion of responses and the percentage of candidates for each option in this question is shown by Figure 5.

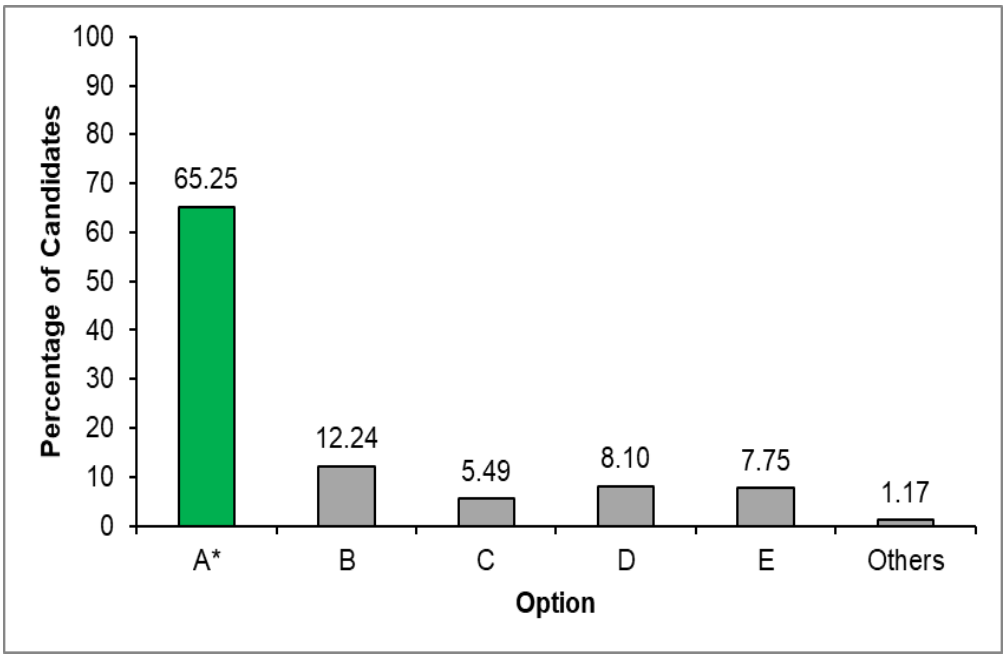


Figure 5: *Candidates' percentage for each option*

Figure 5 shows that 65.25 percentage of the candidates attempted this question correctly by choosing A; *Air occupies space*. These candidates had enough competence in the properties of matter particularly the gaseous state. Increase of air in the balloon leads to addition of molecules that occupy more space, thus causing the balloon to increase its volume and finally burst.

On the contrary, 33.58 percent of the candidates chose among the distractors B, C, D and E. The candidates who opted for B, *Air is heavier than balloon* related the weight of air with that of balloon. Those candidates lacked competence to understand that under normal circumstances, a balloon is heavier than air. Those who chose C, *Air consists of tiny particles* did not realise that, particles are the components of air and the reason for a balloon to expand is the pressure exerted to its wall by air. Presence of particles alone cannot be the reason the for balloon to expand. Likewise, those who opted for D, *The balloon is so smooth* and E, *The balloon is elastic* were not aware that smoothness is the quality of surface without any roughness and elasticity is the ability of a stretched material to return to its original shape and size when stretching forces are removed. Without pressure, these properties do not support the expansion of a balloon.

Question 8: For animals to survive they need food from plants and other things from the environment. Which other things do they need apart from food?

A Light and heat. B Water and wind.
C Air and nutrients. D Light and shadow.
E Water and air.

This question measured the candidates' competence in identifying basic needs for animals' survival. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 933,164 (69.08%) responded correctly and 400,951 (26.68%) failed to respond correctly. Figure 6 shows the dispersion of answers and percentage of candidates for each option on question 8.

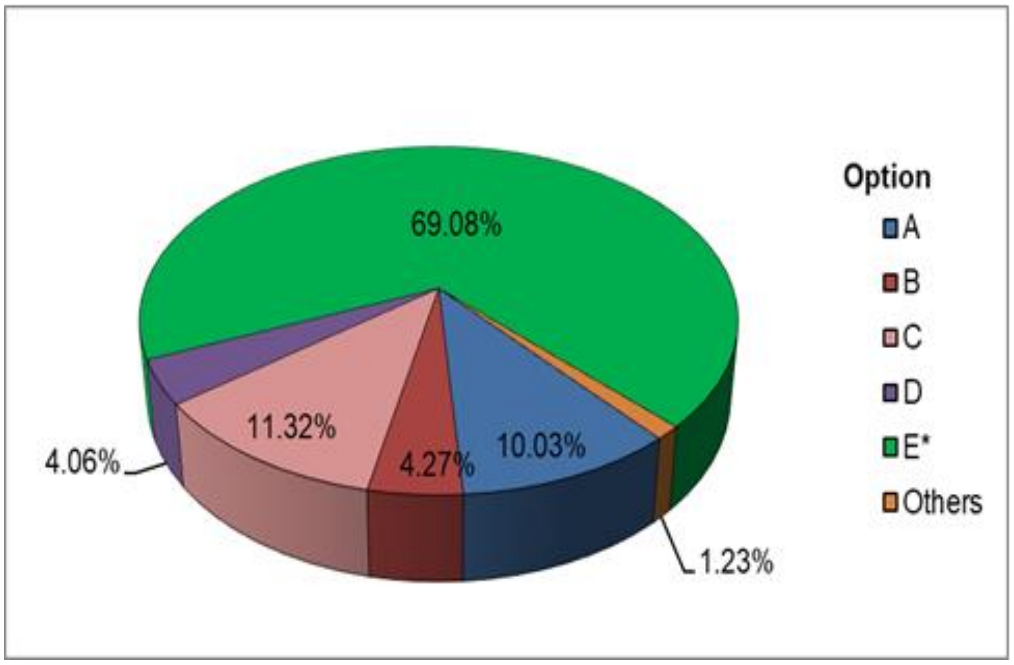


Figure 6: *The percentage of candidates in each option*

Data in Figure 6 indicates that the overall performance of the candidates on this question was good since 69.08 per cent of chose the correct answer E; water and air. These candidates had competence and good understanding on the role of water and air in the body of animals. The candidates who responded correctly had sufficient knowledge about the roles of water such as transportation of nutrients and regulation of body temperature. They also knew that air is important as it is used in the respiration process.

On the contrary, 26.68 per cent of the candidates who attempted this question chose the distractors A, B, C and D. These candidates lacked enough competence in the basic requirements for animals' survival. For instance, those who opted for A, *Light and heat* did not realise that light helps only in vision among animals but it is not necessary for their survival. Candidates who opted for B, *Water and wind* did not understand that the function of wind is to produce energy. Candidates who chose C, *Air and nutrients*, failed to realise that nutrients are food particles. Furthermore, candidates who opted for D, *Light and shadow*

did not realise that shadow is formed when the light is blocked and it is not required for animals to survive.

Question 9: One of the atoms found in many fertilizers is also found in the air as a gas. Which atom is that?

A Argon B Oxygen C Hydrogen
D Nitrogen E Carbon dioxide.

The question assessed the candidates' competence in the concept of air composition and the nutrients required for plant growth. The question was attempted by 1,350,794 candidates. Data analysis indicates that the candidates' performance was weak since 470,262 (34.81%) responded correctly and 859,184 (63.60%) failed to respond incorrectly to the question. Table 9 shows candidates' percentage for each option on question 9.

Option	A	B	C	D*	E	Others
No. of candidates	278959	206586	167357	470262	206282	21,348
% of candidates	20.65	15.29	12.39	34.81	15.27	1.58

Table 3: *Percentage of Candidates on each option*

Table 3 reveals that 63.60 per cent of the candidates chose wrong options. The candidates opted for distractors A, B, C and E had insufficient knowledge of air composition and plant nutrients. For instance, those who opted for A, *Argon* did not have enough knowledge about the role of argon that is used in electric bulb. Candidates who chose alternative B, failed to understand that oxygen is used in respiration for plants and animals. Those who opted for alternative C, *Hydrogen* did not have enough knowledge about role of hydrogen which is filling the balloons and production of chemicals. Those who chose alternative E, *Carbon dioxide* did not realise that, carbon dioxide is used by plants for photosynthesis.

On the other hand, 34.81 per cent of the candidates chose the correct answer D; Nitrogen. These candidates had an understanding on the concept of air and plants nutrients. Therefore, they were able to realise

that nitrogen is a component of both air and plant nutrients which is required abundantly for plant growth.

Question10: What effect does the use of coal as a source of energy in industries has?

A Pollutes atmospheric air.
B Damage industrial system.
C Produces very little energy.
D Produces nitrogen gas.
E Its energy has very high resistance.

The question assessed the candidates' competence in identifying the effects of using coal as a source of energy. The overall performance on this question was good as out of 1,350,794 candidates who did the question, 976,270 (72.27%) responded correctly and 358,733 (26.56%) failed. The percentage of candidates on each option is summarized on figure 7.

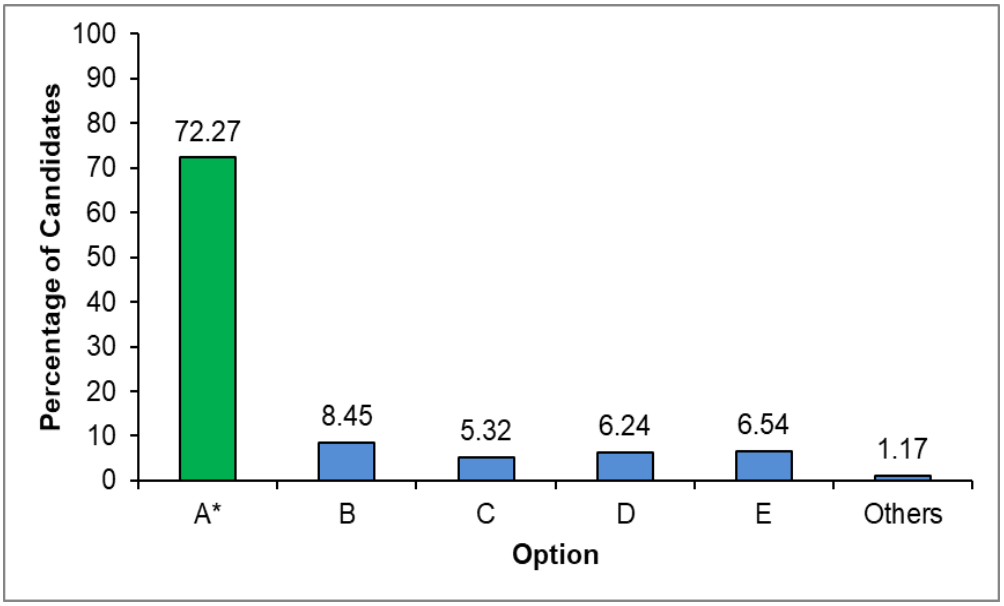


Figure 7: *Candidates' percentage on each option*

Statistics in Figure 7 shows that, 72.27 per cent of candidates selected correct response A, *Pollutes atmospheric air*. These candidates understood that burning coal produces some hazardous gases (carbon dioxide and methane) which pollute atmospheric air.

Further analysis indicates that 26.65 per cent of the candidates opted for distractors B, C, D and E. These candidates lacked competence in the effects of polluted air from industries. For example, those who chose B, *Damage industrial system* did not realise that when coal is used for energy production, special machineries which withstand very high temperature. Those who chose C, *Produces very little energy* did not realise that coal is one of the abundant energy sources. Those who chose D, *Produces nitrogen gas*, were not aware that when coal is burnt, it produces carbon dioxide and methane but not nitrogen. Moreover, those who chose E, *Its energy has very high resistance* were against the reality that, coal energy can be easily accessed and used.

Question 11: If it happens electrical appliances at your school such as television, radio and lamps have suddenly switched off, what will be your first step in solving the problem?

A Changing the fuse of the appliances.
B Inspecting the electrical system.
C Changing plug fuses.
D Changing the circuit breaker fuse.
E Repairing the main switch.

The question assessed candidates' competence in recognizing electrical faults and their solutions. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 513,170 (37.99%) responded correctly and 815,696 (60.38%) incorrectly responded. The general performance of candidates on this question was weak. Table 4 shows candidates' percentage on each option.

Option	A	B*	C	D	E	Others
No. of candidates	131049	513170	82513	157312	444822	21,928
% of candidates	9.70	37.99	6.11	11.65	32.93	1.62

Table 4: *Candidates' percentage for each option*

Data from table 4 reveals that 37.99 per-cent opted for correct answer B, *Inspecting electrical system*. These candidates understood that the

only possibility for the television, radio and lamps to switch off at once could be defaults in electrical system. They managed to find out that if the problem could happen to one of the appliances then the rest could keep on functioning. Since all of them went off at a time, then the problem could be fixed by checking the whole electrical system.

Nevertheless, 60.38 percent of the candidates chose incorrect responses A, C, D and E. This category of candidates failed to recognize the appropriate step to be taken in solving the electrical problem that happens. For example, those who chose distractors A, *Changing the fuse of the appliances*; C, *Changing plug fuse* and D, *Changing the circuit breaker fuse* were not aware that fuses of different appliances have different capabilities and thus, they cannot be blown off by current (power) of the same quantity at a time. Those who selected distractor E, *Repairing the main switch* did not realise that the decision of changing the main switch is reached when all possible shortcomings in the electrical system are checked and confirmed no defect.

Question 12: A hunter was supposed to make fire using his spectacles with convex lenses in order to roast meat. What property of light was demonstrated by the hunter's spectacles?

A Absorption of light. B Converging of light.
C Diverging of light. D Reflection of light.
E Bending of light.

The question tested the candidates' competence in the concept of properties of light. The performance in this question was weak as 1,30,794 attempted the question. Amongst them, 236,203 (17.49%) candidates responded correctly and 860,857 (63.73%) candidates incorrectly answered. The percentage of the candidates on each option is shown in Table 5.

Option	A	B*	C	D	E	Others
No. of Candidates	236203	470278	186338	351416	86900	19,659
% of candidates	17.49	34.81	13.79	26.02	6.43	1.46

Table 5: *Candidates' percentage for each option*

Table 5 shows that 63.73 per cent of the candidates opted for either of the distractors A, C, D and E. This indicates that, these candidates did not realise the role of a convex lens. For example, the candidates who chose distractor A, *Absorption of light* did not know that light is absorbed by black bodies and not lenses. Those who chose C, *Diverging of light* failed to understand that diverging light is caused by concave lens. The candidates who selected option D, *Reflection of light* did not know that the reflection of light is caused by plain mirrors instead of convex lens. Those who chose E, *Bending of light* did not understand that the bending of light occurs when light travels from one medium to another.

On the other hand, 34.81 per cent of the candidates opted for the correct option B, *Converging of light*. These candidates had enough knowledge to understand that the main property of a convex lens is to converge light rays. They recognize that, the only way fire can be made is by converging light rays and directing them at one point using convex lens. The increase of light intensity at a particular point causes heat energy to form.

Question13: Mr. Matata's house has three rooms and all of them uses electric current from one main supply. How would you know that the house uses parallel circuit connection?

A Removal of the bulb in the first room will cause the bulb in the second and third room to go off.

B Removal of the bulb in the first room will cause the bulb in the second and third room to be on.

C Removal of the bulb in the second room will cause the bulb in the third room to go off.

D Removal of the bulb in the third room will cause the bulb in the second room to go off while that in the first room will be on.

E Removal of the bulb in the second room will cause the bulb in the first room to go off.

The question measured candidates' competence in identifying types and properties of circuits. A total of 1,350,794 candidates attempted this question. Analysis indicates that the overall performance on the

question was weak as 110,759 (35.72%) candidates responded correctly and 845,965 (62.63%) failed to respond correctly. Figure 8 shows candidates' percentage in each option.

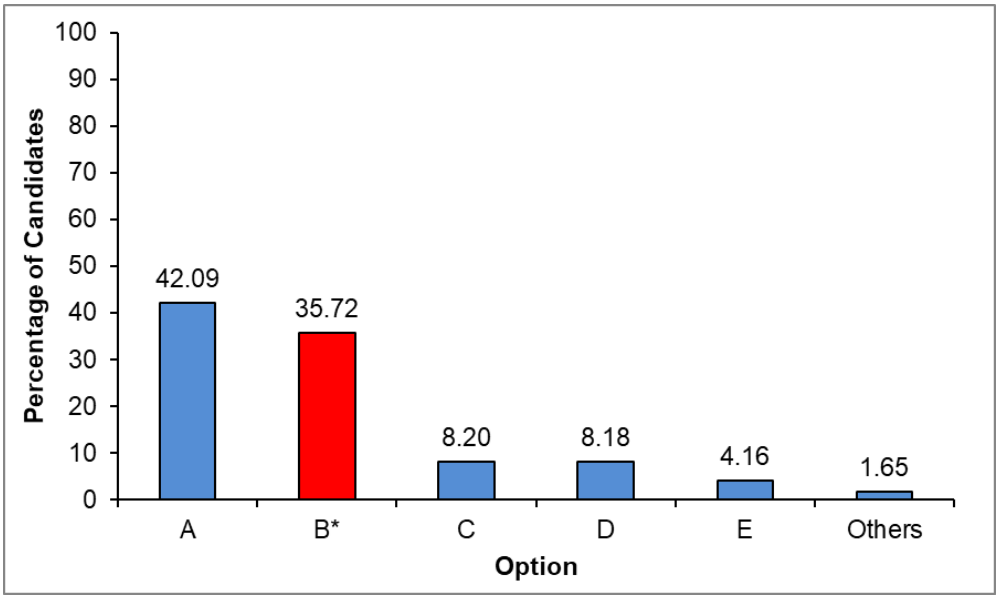


Figure 8: *Candidates' percentage for question 13*

Figure 8 shows that, the general performance of the question was weak. As 35.72 per cent of the candidates opted for the correct option as shown in Figure 8.

Figure 8 shows that 62.63 percent of the candidates chose incorrect responses A, C, D and E. These candidates lacked understanding of the types and properties of electric circuits. Example, those who chose alternatives A, *Removal of the bulb in the first room will cause the bulb in the second and third room to go off*; C, *Removal of the bulb in the second room will cause the bulb in the third room to go off*; D, *Removal of the bulb in the third room will cause the bulb in the second room to go off while that in the first room will be on* and E, *Removal of the bulb in the second room will cause the bulb in the first room to go off* lacked knowledge on how parallel circuits operates. In parallel connection, defect in one appliance does not affect the functioning of others different from serial connection in which when a bulb gets a defect the rest will not work.

Nevertheless, 35.72 per cent of the candidates selected the correct option B, *Removal of the bulb in the first room will cause the bulb in the second and third room to be on*. These candidates had enough competence to understood that when appliances are in parallel connection, the damage of one appliance will not affect the functionality of the other appliances. That is why the removal of a bulb in the first room did not affect bulbs in other rooms.

Question 14: A child was playing outside far away from the kitchen. He sensed a pleasant smell of food cooked by her sister. In which way did the smell reach the child?

A Diffusion B Respiration C Osmosis
D Molecule E Evaporation.

The question assessed the candidates' competence to understand the concept of diffusion and osmosis. The performance on this question was average as 1,350,794 candidates did the question and 806,315 (59.69%) candidates correctly responded to the question and 525,404 (38.90%) failed. The percentages of candidates on each option is shown in Figure 9.

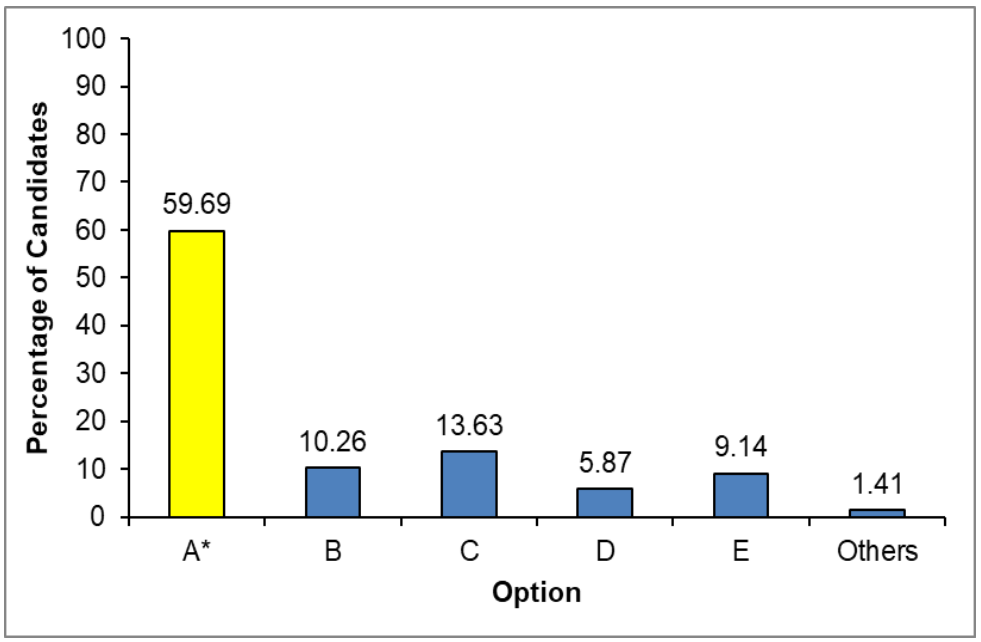


Figure 9: *Candidates' percentage for each option*

Data in Figure 9 shows that, 806,315 (59.69%) chose the correct answer A, diffusion; This made the general performance on the question to be average. These candidates had enough competence in understanding how molecules of good smell of food moved from the area of high concentration to that of low concentration, a process known as diffusion.

Further analysis shows that 38.90 per cent of the candidates who chose distractors B, C, D and E had insufficient competence and lacked understanding of the concept of diffusion and osmosis since those distractors were contrary to the task asked in the question. For example, alternative B, *Respiration*, was not a correct response because it deals with the breakdown of food to release energy. C, *Osmosis* is the process by which water molecules move from a solution of low to high solute concentration through a semi-permeable membrane. Alternative D, *Molecule* is the group of two or more atoms held together by a chemical bond and E, *Evaporation* is a change of liquid to vapour through boiling.

Question 15: Matter shows chemical or physical changes. Which are the examples of a chemical change?

A Rusting of iron, souring of milk and burning of charcoal.
B Souring of milk, baking bread and dissolving sugar in water.
C Cooking of food, baking bread and mixing salt and water.
D Water to become ice, souring of milk and burning of charcoal.
E Dissolving sugar in water, burning of charcoal and baking bread.

This question assessed the candidates' competence in identifying physical and chemical changes of matter. The performance on this question was good. 1,350,794 candidates attempted the question, amongst them 855,126 (63.60%) candidates responded correctly and 476,300 (35.26%) failed. The summary for candidates' percentage for each option are shown in Figure 10.

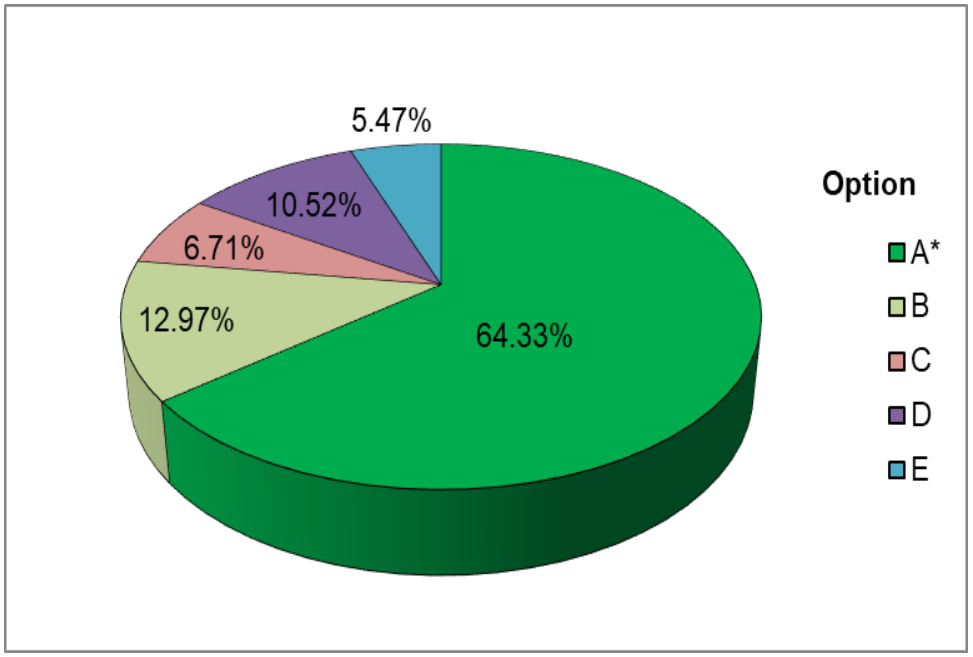


Figure 10: *Candidates percentage in each option*

The data in Figure 10 shows that 63.60 per cent of the candidates chose the correct response A, *Rusting of iron, souring of milk and burning of charcoal* as examples of chemical changes. These candidates understood that rusting of iron, souring of milk and burning of charcoal result in a new substance that cannot be reversed to its original form. These candidates were competent in physical and chemical changes with their respective examples.

Further analysis shows that 35.26 per cent candidates chose one among the incorrect alternatives B, C, D and E. These candidates lacked competence in identifying physical and chemical changes of matter. For example, candidates who chose alternative B *Souring of milk, baking bread and dissolving sugar in water;* C, *Cooking of food, baking bread and mixing salt and water;* D, *Water to become ice, souring of milk and burning of charcoal* and E, *Dissolving sugar in water, burning of charcoal and baking bread* did not realise that water to becoming ice, dissolving of sugar in water and mixing of salt and water are physical changes and not chemical changes.

Question 16: The ICT teacher assigned the pupils to enter data in a worksheet. Which cell will allow to type the intended data?

A The first cell. B Active cell. C Cell box.
D Row cell. D Column cell.

This question assessed the candidates' competence in understanding the concept of spreadsheet. Statistics revealed that the performance on this question was weak. Out of 1,350,794 candidates attempted the question, 522,152 (38.66 %) candidates correctly answered the question and 808,995 (59.89 %) failed. Table 6 shows the dispersion of candidate's responses and their percentages for each option.

Option	A	B*	C	D	E	Others
No.of candidates	202860	522152	223022	187110	196003	19647
% of candidates	15.02	38.66	16.51	13.85	14.51	1.45

Table 6: *Candidates percentage on each option*.

Statistics from Table 6 show that 59.89 per cent of the candidates opted for distractors A, C, D, and E. For example, those who opted for A, *the first cell* did not realise that if the first cell is not selected by a cursor it will not be active therefore, no data can be entered. Those who chose distractor C, *Cell box* did not know that a cell box occurs at the intersection of vertical column and horizontal rows. It is not necessarily active. Those who chose distractors D and E were not aware that rows and columns are used to increase or reduce the size of the cell.

Further analysis of data reveals that 38.66 percent of the candidates chose the correct response *B, Active cell*. These candidates understood that active cell is a currently selected cell for entering or editing data.

Question 17: Mr. Hamza wants to buy an antenna for receiving various television and radio electromagnetic waves. Which type of antenna would you advise him to buy?

A Loop B Yagi-Uda C Horn
D Aperture E Conical.

The question assessed candidates' competence to identify types of antennae. A total of 1,350,794. candidates attempted this question, out of them 586,308 (43.40%) candidates correctly attempted and 744,646 (55.13%) failed. The overall candidates' performance on this question was average as shown in Figure 11.

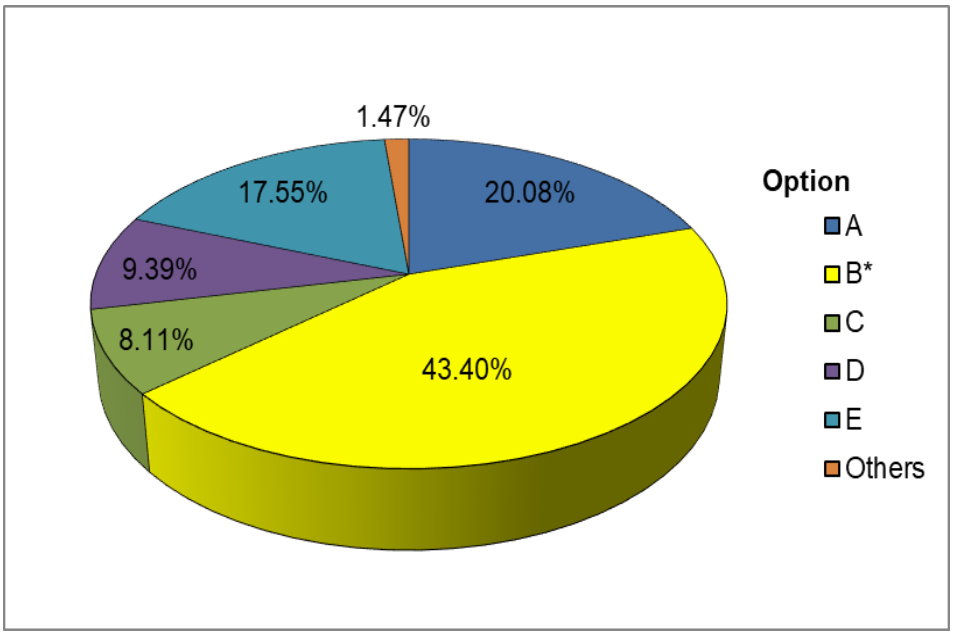


Figure 11: *Candidates' percentage in each option*

Figure 11 reveals that 55.13 of the candidates selected incorrect responses. These candidates lacked competence and knowledge about types of antennae. This category of candidates opted for either of the distractors A, C, D, or E. For example, those who chose distractor A, *Loop* did not understand that the loop antenna receives and transmits radio waves only. Likewise, those who chose option C, *Horn* did not understand that the horn antenna is used to carry and transmit radio waves from wave guides (metal pipe used to carry radio waves). Moreover, the candidates who opted for D, Ape*rture* and E, *Conical* were not able to understand that the aperture antenna and the conical antenna are simply types of horn antennae which have the same role to transmit radio waves.

On the other hand, 43.40 per cent of the candidates selected the correct answer B, *Yagi-Uda*. The candidates who selected this

response had clear knowledge about the use of Yagi-Uda antenna. They knew that this type of antenna is used to collect and transmit Radio and Television waves to a wide range of frequencies.

Question 18: The teacher assigned the pupils to identify the types of computer input devices. Which one is an example of input devices?

A Monitor B Printer C Keyboard
D Speaker E Processor.

The question intended to measured candidates' competence on identifying types of computer input devices. A total of 1,350,794 candidates attempted the question, out of whom 586,308 (43.40%) candidates answered correctly and 768,065 (56.86%) failed. The general candidates' performance on this question was average Table 7 shows the dispersion of candidates' responses and their percentages on each option.

Option	**A**	**B**	**C***	**D**	**E**	**Others**
No.of candidates	238306	200360	562719	170836	158563	20010
% of candidates	17.64	14.83	41.66	12.65	11.74	1.48

Table 7: *Candidates percentage in each option*

Statistics from Table 7 reveals that, 56.86 per cent of the candidates failed the question. Those candidates opted for distractors A, B, D and E. This indicates that those candidates lacked competence to identify types of input devices. For example, those who opted for distractors A; *monitor*, B; *printer* and D; *speaker* are output devices because they take information from the computer and give them out. Moreover, those who opted for E, *Processor* did not understand that a processor processes data and gives out information to the computer system.

On the other hand, 586,308 (43.40%) candidates select the correct response C, *keyboard*. This reveals that the candidates on this category had enough competence and understanding of the types of computer input devices. The candidates who opted for this answer

understood that the keyboard is an input device because it enters information into the computer.

Question 19: Madilu wants an electronic machine that has an ability to receive process, store and give out information of sales in his shop. Which device would you advise him to buy?

A Television
B Computer
C Decoder
D Memory card
E Electromagnetic waves.

The question examined candidates' competence in identifying information communication and technology appliances. The analysis shows that 1,350,794 candidates did the question. Among them 814,862 (60.32%) chose the correct answer and 519,239 (38.44%) failed. The general candidates' performance on this question was good. Figure 12 gives a clear dispersion of responses of candidates and their percentages on each option.

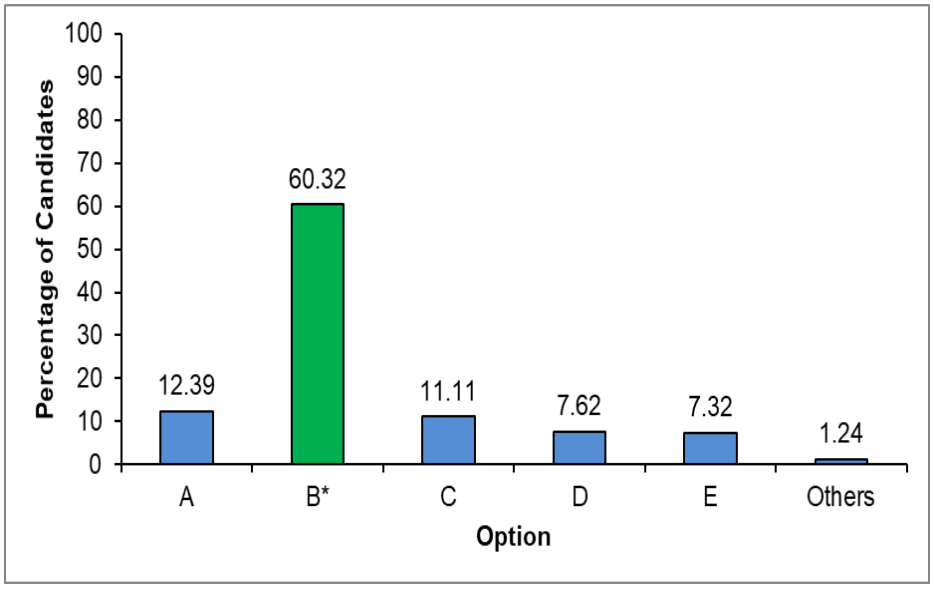


Figure 12: *Candidates' percentages for each option*

Figure 12 shows that 60.32 per cent of the candidates chose the correct option B, *Computer*. The candidates who chose this response understood that among the given devices, computer was the only one which can receive, process, store and give out information.

Conversely, some candidates made wrong choices. Those who opted for distractor A, *Television* did not understand that Television is an electronic device that converts electromagnetic information into picture and sound. Also, the candidates who chose C, *Decoder* did not understand that the decoder receives electromagnetic signals and converts them into visual and audio information. Alternative D, *Memory card*, which is an electronic chip that stores information only. Those who opted for distractor E, *Electromagnetic waves* did not understand that Electromagnetic waves are signals which travel at the speed of light.

Question 20: Which communication device is used to receive electromagnetic waves and convert them into sound and image?

A Antenna B Television C Radio
D Phone E Television decoder.

The question assessed candidates' competence in identifying information communication and technology appliances. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 403,764 (29.89%) responded correctly and 799,274 (59.71%) failed to respond correctly. Table 20 shows the dispersion of responses and the percentage of candidates' percentage on each option.

Option	A	B*	C	D	E	Others
No. of candidates	403764	532726	94761	196147	104602	18794
% of candidates	29.89	39.44	7.02	14.52	7.74	1.39

Table 8: *Percentages of candidates for each option*

Table 8 shows that, 59.71 percent of candidates responded wrongly by choosing one among distractors A, C, D and E. Those candidates lacked competence in identifying information communication technology appliances which converts electromagnetic waves to sound and picture. For example, those who chose A, *Antenna* did not understand that antenna receives and transmits signals. Those who opted for C, *Radio*, were not aware that radio has the role of converting electromagnetic waves to sound. The candidates, who chose alternative D, *Phone,* did not understand that some phones give out sound only and some give sound and image. Those who opted for E, *Television decoder* lacked the awareness that a decoder is part of a television.

On the other hand, analysis indicates that 532,726 candidates chose the correct answer B, *Television.* These candidates had enough competence and understood that television converts electromagnetic waves into sound and image.

Question 21: The science teacher instructed all Standard Three pupils to bring rulers in order to perform measurement. Which measurement did the teacher want the pupils to perform?

A Volume B Length C Mass
D Weight E Time.

The question assessed candidates' competence in understanding the concept of measurement. The question was attempted by 1,350,794 candidates. Analysis shows that 1,053,885. (78.02%) responded correctly and 284,106 (21.04%) failed. Figure 13 shows the dispersion of answers and the percentage of candidates on each option.

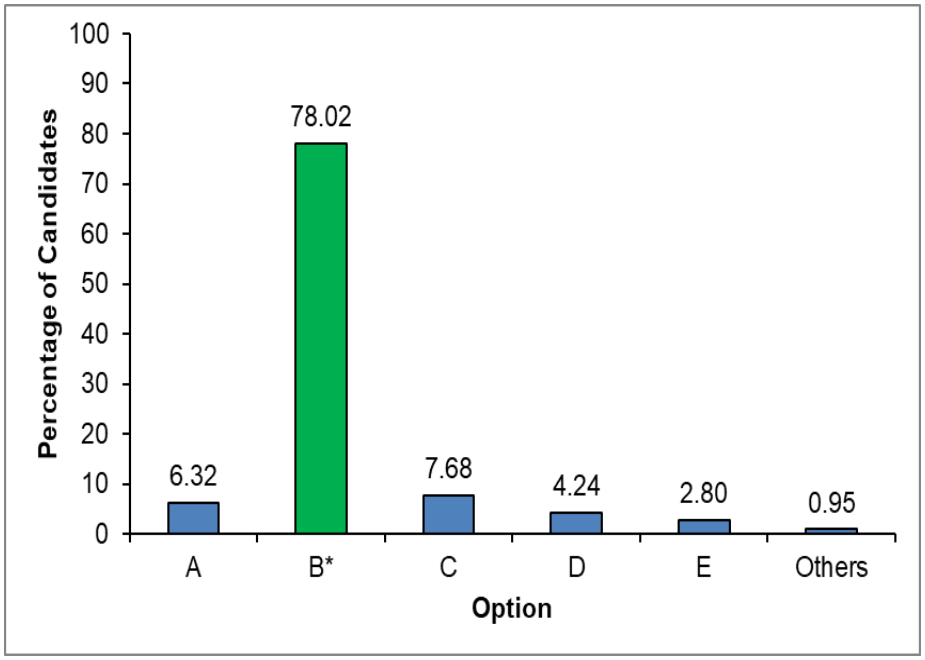


Figure 13: *Percentages of candidates for each option*

Figure 13 shows that 78.02 per cent of candidates who opted for the correct answer B, *Length* were aware that a ruler is a device used to obtain standard measurement of length.

The candidates who chose incorrect responses A, C, D and E were not aware of the standard measurement obtained by using a ruler. For example, those who chose distractor A, *Volume* did not understand that volume is measured by using a measuring cylinder. Others who opted for C, *Mass* did not understand that mass is measured by using a beam balance. Likewise, those who chose distractor D, *Weight,* did not understand that weight is measured by using a spring balance. Moreover, those who opted for E, *Time* did not know that time is measured by a clock.

Question 22: Following the arrangement of parts of the lever, which arrangement represents first class lever?

A Effort is found between pivot and wheel.
B Load is found between effort and fulcrum.
C Effort is found between fulcrum and load.
D Fulcrum is found between effort and load.
E Load is found between fulcrum and balance.

The question assessed the candidates' competence in the concept of lever. The performance on this question was weak. Among 1,350,794 candidates who attempted the question, 488,802 (36.19%) candidates responded correctly while 1,023,661 (75.78%) failed. The percentage of the candidates in each option is shown in Figure 14.

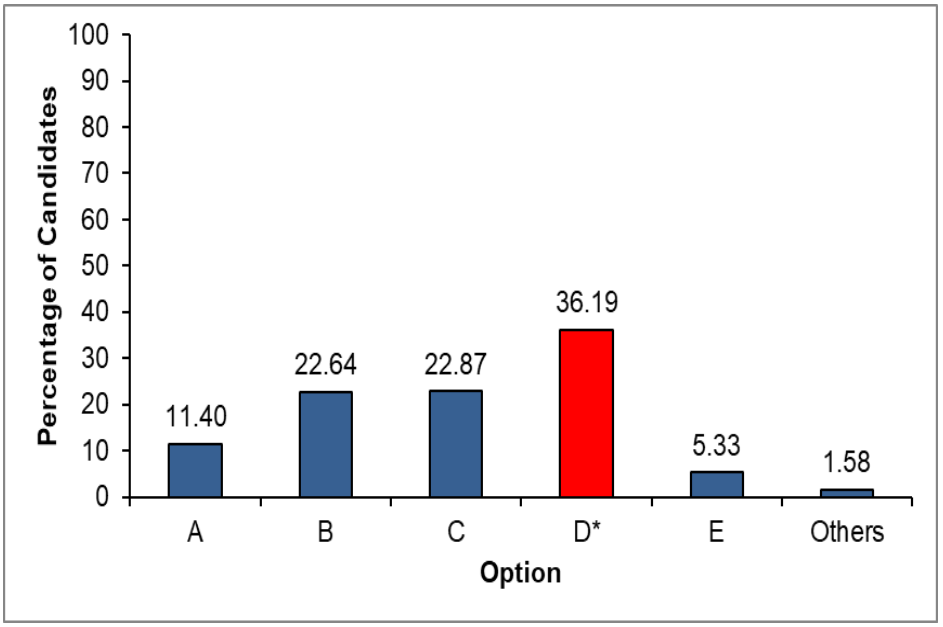


Figure 14: *Percentages of candidates for each option.*

Data in Figure 14 shows that the correct answer was E, *Load is found between fulcrum and balance*. The data shows that 75.78 per cent of the candidates wrongly chose either of the distractors A, B, C and E. These candidates, lacked competence in the concept of lever. For example, those who opted for distractor A, *Effort is found between pivot and wheel* did not understand that a wheel is just part of a machine. Likewise, candidates who chose B, *Load is found between effort and fulcrum* had no knowledge of the fact that this is the second-class lever. Distractor C, *Effort is found between fulcrum and load* was chosen by candidates who failed to understand that this is the third-class lever. Similarly, candidates who selected distractor D, *Load is found between fulcrum and balance* did not understand that the word *balance* is the state of a machine to be at equilibrium position.

Figure 14 shows that 36.19 per cent of the candidates chose the correct response which was D, *Fulcrum is found between effort and load*. Candidates who opted for this alternative understood that, in the first class levers, the fulcrum is between load and effort.

Question 23: If the total work done by a pupil who pulled a box at a distance of 20 meters was 240 Joules. How much force was applied in Newton?

A 4,800 B 120 C 12
D 48 E 480.

The question assessed candidates' competence in calculating force by using the correct formula. A total of 1,350,794 candidates did the question. Out of whom 588,556 (43.57%) responded correctly while 741,843 (54.91%) failed. The general performance on the question was average. The dispersion of responses and candidates' percentage on each option is shown in Figure 15.

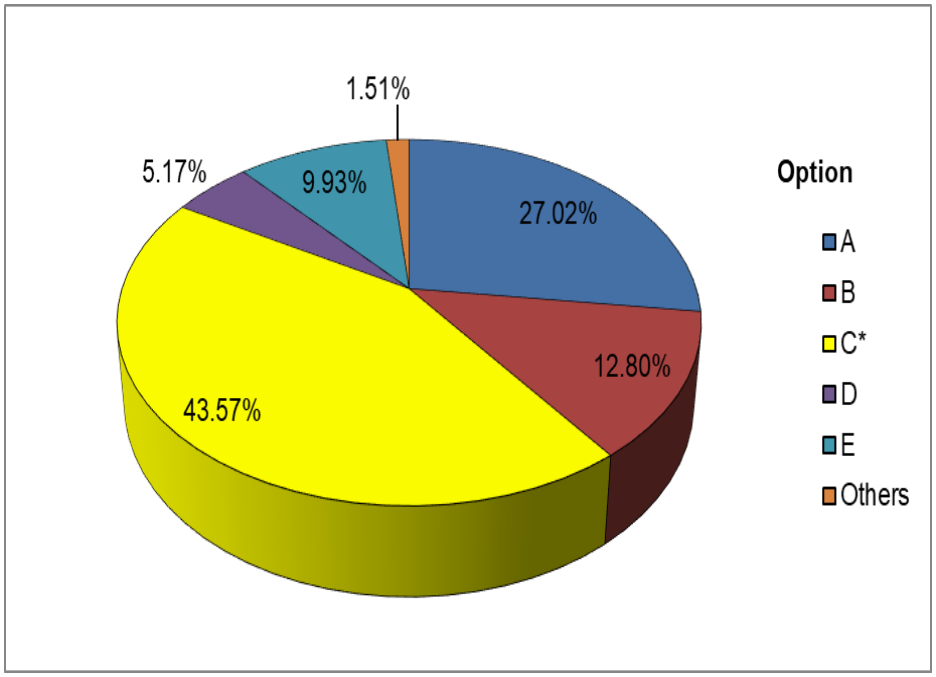


Figure 15: *Percentages of candidates for each option*

Figure 15 shows that, 54.91 percent of the candidates selected incorrect responses. These candidates lacked enough mathematical skills to perform calculations, while others did not know the correct formula to use. These candidates opted for distractors A, B, D and E. For example, those who opted for distractors A, *4800*; D, *48* and E, *480* lacked competence in calculation and using the proper formula for, *force = work* × *distance=240* × *20 = 4800, 240* × *20 = 48 and 240* × *20 = 480*. Likewise, those who opted for distractor B, *120* calculation skills, *force = work/distance = 240/20 =120*.

On the other hand, the percentage of candidates who chose the correct response was 43.57. Those candidates opted for a correct response, which was C, *12*. The candidates who responded correctly were able to use the correct formula of *work = force* × *distance* to calculate force such that *force = work/distance= 240/12= 12*.

Question 24: A science teacher used the battery of 2 volts and a resistor of 0.2 ohm to connect an electric circuit. What was the amount of electric current obtained in the circuit?

A 0.01 A B 0.1 A C 10 A
D 0.4 A E 40 A.

The question evaluated candidates' competence in using Ohm's law to calculate the amount of electric current in the circuit. According to the analysis, a total of 1,350,794 candidates did the question. Candidates who did the question correctly were 366,419 (27.13%) and those who did the question wrongly were 965,419 (71.47%). The general performance was weak. Figure 16 shows the dispersion of responses and candidates' percentage in each option.

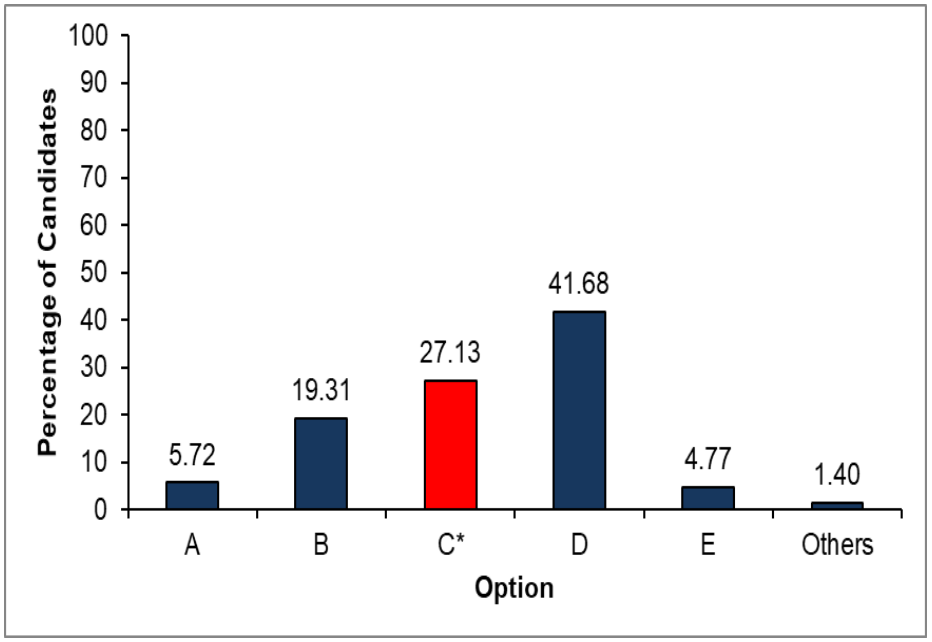


Figure 16: *Candidates' percentages for each option*

Figure 16 shows that 71.47 per cent of the candidates wrongly opted for distractors A, B, D and E. These candidates lacked enough mathematical skills in calculations while others did not know the correct formula to use. For example, those who opted for distractors A, *0.01 A* and B, *0.1 A* lacked calculation abilities and used the incorrect formula, *I = R*/V *= 0.2/2 = 0.1 A* and *0.2/2 = 0.01 A*. Similarly, those who opted for distractor D, *0.4 A* and E, *40 A* lacked calculation abilities and used the incorrect formula I = RV = *0.2 x 2 = 0.4 A* and 0.2 x 2 = *40 A*

Figure 16 shows that the correct answer was C, 10 A. Other 27.13 per cent of the candidates opted for it. The overall performance of the question was weak. Those who did this question correctly were able to use Ohm's law $V = IR$ then $= \frac{V}{R} = \frac{2}{0.2} = 10\,A.$

Question 25: A bus driver used the side mirror to see the image of a car coming behind him. What type of a mirror did he use?

A Concave mirror
B Plane mirror
C Modern mirror
D Convex mirror
E Normal mirror.

The question was intended to measure candidates' competence in identifying types of mirrors and their properties. Analysis shows that candidates who did this question were 1,350,794 out of whom 404,601 (30.09%) candidates chose the correct answer and 925,364 (68.50%) failed. Table 9 summarizes the percentage of candidates in each option.

Option	A	B	C	D*	E	Others
No. of Candidates	238745	558360	64064	406401	64195	19029
% of Candidates	17.67	41.34	4.74	30.09	4.75	1.41

Table 9: *Percentages of candidates for each option*

Table 9 shows that 68.05 per cent of the candidates failed the question. Those candidates lacked competence in recognizing types of mirrors and their properties hence they chose distractors A, B, C and E. For example, candidates who chose A, *Concave mirror* did not understand that concave mirrors give parallel beam of light after passing through it. That is why it is used in motor vehicles headlights or torches. Likewise, those who opted for B, *Plain mirror* did not know that it forms a virtual (behind) and inverted (upside down) images that is why they are used in periscopes to produce multiple images. Those who chose distractor C, *Modern mirror* and E, *Normal mirror* did not realise that modern and normal mirrors are the terms used to categorize mirrors according to era (recent or previous).

Further analysis shows that 30.09 per cent of candidates opted for the correct answer D, *convex mirrors*. This shows that the candidates were competent in identifying types of mirrors and their properties. These candidates had enough competence to understand that convex mirrors have the ability to show a wide area and their images are upright.

Question 26: Biogas comprises a mixture of different gases. Which gas is in larger quantity than others?

A Hydrogen sulphide
B Carbon dioxide
C Methane
D Ammonia
E Hydrogen.

The question assessed the candidates' competence in identifying the composition of biogas. The question was attempted by 1,350,794 candidates out of whom 566,319 (41.92%) responded correctly and 766,250 (56.73%) failed. The general candidates' performance on this question was average. Figure 17 shows candidates' percentage in option.

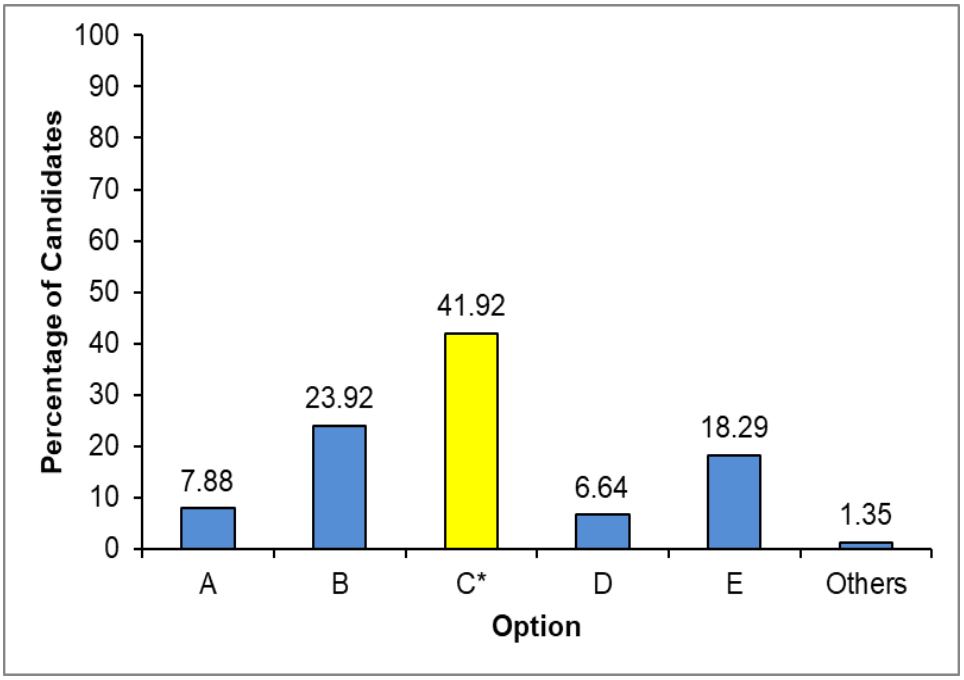


Figure 17: *Candidates' percentage in each option*

Data from Figure 17 shows that, 56.73 per cent of the candidates failed to choose the correct answer. Those candidates chose incorrect responses A, B, D and E. This indicates that, the candidates lacked competence on identifying that methane is found in large amount in biogas. For example, those who opted for A, *Hydrogen sulphide*; B, *Carbon dioxide*; D, *Ammonia* and E, *Hydrogen* failed to

realise that these gases are found in smaller amount in the biogas compared to methane.

On the other hand, 566,319 (41.92%) candidates chose the correct alternative C, *Methane.* These candidates understood that the major component of biogas is methane.

Question 27: A body of a diabetic person fails to produce insulin. Which organ of person has a problem?

A Liver B Pancreas C Brain
D Ovary E Gall bladder.

The question assessed candidates' competence to identify an organ responsible for production of insulin. Data shows that the general candidates' performance on this question was average. 1,350,794 candidates did the question, out of whom 575,278 (42.59%) candidates chose the correct answer and 498,414 (56.02%) candidates chose the wrong alternatives. The dispersion of responses and candidates' percentage for each option is shown in Table 10.

Option	A	B*	C	D	E	Others
No. of candidates	287081	575278	75181	237385	157147	18722
% of candidates	21.25	42.59	5.57	17.57	11.63	1.39

Table 10: *Candidates' percentages for each option*

Table 10 shows that, 56.02 percent of candidates chose wrong options A, C, D, and E. Those candidates were not competent in recognizing an organ responsible for insulin production. For example, those who opted alternative A, *Liver,* were not aware that the liver removes toxins and aids in digesting food rich in proteins and fats. Also, those who chose C, *Brain* failed to understand that the main function of the brain is to coordinate various actions including learning, remembering, speaking and thinking. Candidates who opted distractor D, *Ovary,* were not aware that the ovaries are part of the female reproductive system which produce ova (female gamete).

Those who opted alternative E, *Gall bladder,* failed to understand that the gall bladder stores bile juice which helps in the breakdown of fats into small droplets.

On the other hand, 42.59 per cent of the candidates chose the correct response B, *Pancreas.* These candidates realised that pancreas is an organ that is involved in the digestion of food and balancing blood sugar level.

Question 28: Which patient is more likely to get HIV/AIDS?

A The one suffering from syphilis and malaria.
B The one suffering from cholera and bilharzia.
C The one suffering from gonorrhea and fungus.
D The one suffering from trichomonas and tuberculosis.
E The one suffering from chlamydia and asthma.

The question assessed candidates' competence in identifying the association between the sexually transmitted diseases with HIV/AIDS. The performance on this question was weak. 1,350,794 candidates answered the question, among them 447,713 (33.14%) candidates correctly responded, while 883,658 (61.42%) incorrectly responded. The dispersion of responses and the candidates' percentages for each option is shown in Table 11.

Option	**A**	**B**	**C***	**D**	**E**	**Others**
No. of candidates	200455	157889	447713	343103	182211	19423
% of candidates	14.84	11.69	33.14	25.40	13.49	1.44

Table 11: *Candidates' percentages for each option*

Statistics from Table 11 indicates that 61.42 per cent of the candidates failed this question. This indicates that they lacked enough knowledge on the relationship between sexually transmitted diseases and HIV/AIDS as they opted for the wrong alternatives A, B. D and E. For instance, *malaria* in alternative A, *cholera* and *bilharzia* in alternative B and *tuberculosis* in distractor D made those alternatives to be wrong because although those diseases are

communicable diseases, they are not sexually transmitted diseases. Malaria is transmitted by a female mosquito known as Anopheles and it affects red blood cells. Cholera is a bacterial disease-causing severe diarrhoea and vomiting while bilharzia is caused by worms and affects the intestines and the urinary bladder. Moreover, tuberculosis is an airborne disease caused by bacteria and it affects the lungs. Moreover, asthma was the wrong response in distractor E because it is an inheritable disease that affects the respiratory system.

Nevertheless, data shows that 33.14 percent of the candidates chose the correct alternative C, *one suffering from gonorrhea and fungus.* These candidates were knowledgeable that sexually transmitted diseases are associated with the presence of wounds in the reproductive track making it easy for HIV to penetrate the blood circulatory system.

Question 29: A patient went to the hospital where the doctor discovered that his body immunity is very low. What advice do you think the doctor gave to the patient?

A Taking balanced diet and doing physical exercises.
B Living in clean environment and eating much carbohydrates.
C Taking enough water and little resting.
D Doing enough physical exercises and having little rest.
E Taking supplements and much carbohydrates.

The question assessed the candidates' competence in recognizing ways that can be used to raise and strengthen body immunity. Data show that the performance on this question was very good as 1,350,794 who attempted the question, 1,079,157 (79.89 %) candidates chose the correct answer. On the other hand, 260,681 (19.30 %) responded incorrectly. The dispersion of the responses and the candidates' percentage on each option are shown by figure 18.

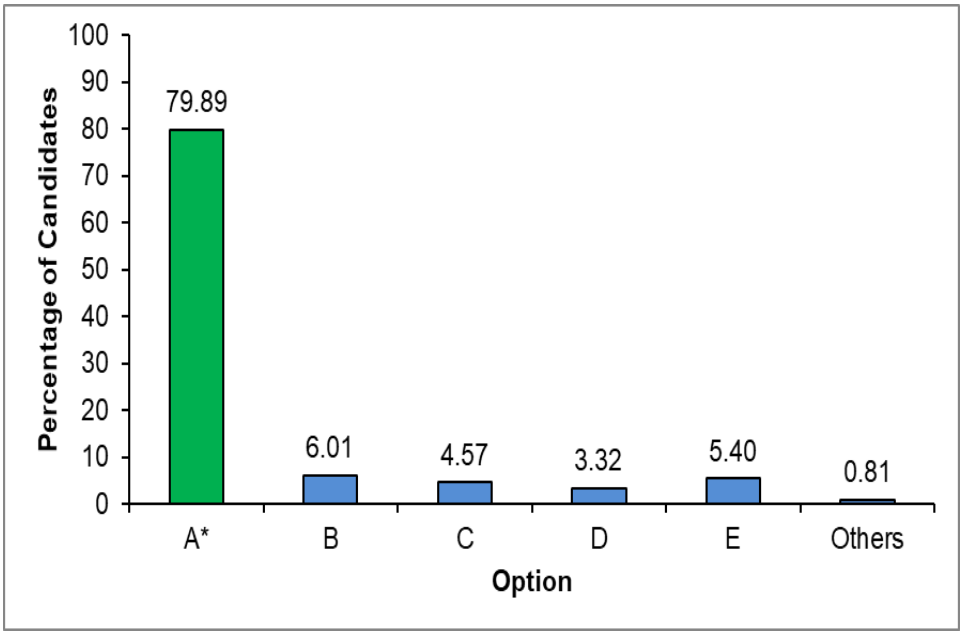


Figure 18. *The percentages of candidates for each option*

Data in Figure 18 reveals that 1,079,157 (79.89 %) candidates chose the correct alternative *A, taking balanced diet and doing physical exercises.* These candidates understood that balanced diet provides the body with nutrients that keep the body healthy and strong. Also, doing enough physical exercises boosts and strengthens body immunity to fight against diseases.

Further analysis shows that 260,681 (19.30%) candidates who chose incorrect alternatives B, C, D and E lacked competence in recognizing ways that can be used to strengthen body immunity. For example, candidates who chose alternative *B, living in clean environment and eating much carbohydrates* and E, *taking supplements and much carbohydrates* were not aware that taking much carbohydrates may lead to obesity instead of strengthening the immunity. Those who chose distractors C, *taking enough water and little resting* and *D, doing enough physical exercises and having little rest* failed to understand that little resting can neither strengthen nor raise body immunity.

Question 30: The reason which distinguishes communicable from non-communicable diseases is that communicable diseases:

A affect all body parts. B cause severe fever.
C spread very fast. D spread by air.
E are cured by vaccination.

The question assessed the candidate's competence to distinguish communicable from non-communicable diseases. The data shows that the performance on this question was poor. As among 1,350,794 who did the question, 469,619 (34.77%) candidates chose the correct answer and 862,833 (63.88%) failed. Figure 19 shows the dispersion of responses and candidates' percentages in each option.

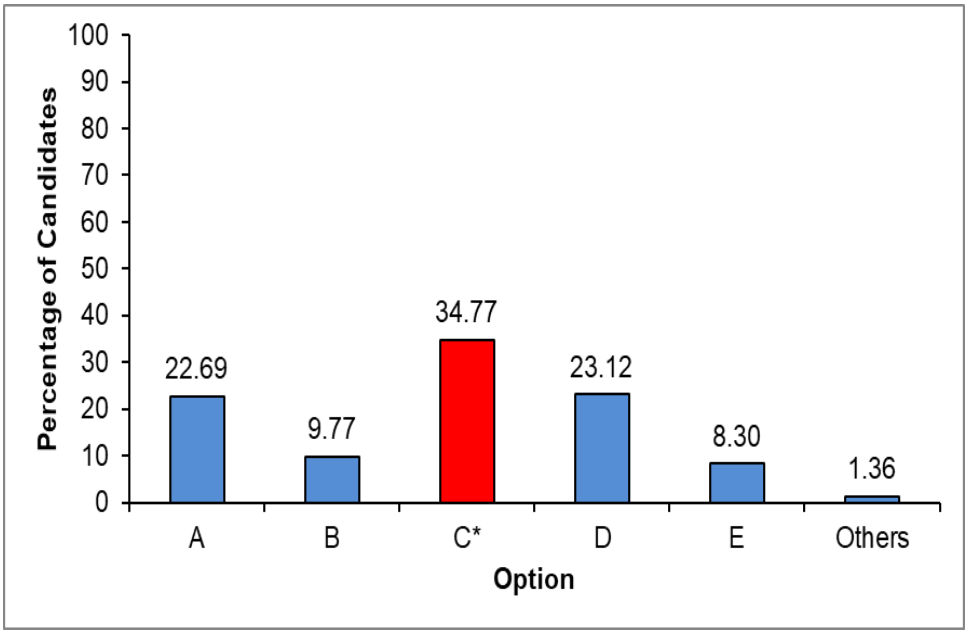


Figure 19: *Candidates' percentages for each option*

Statistics from Figure 19 shows that 63.88 percent of the candidates chose the wrong options A, B, D, and E. For example, those who opted for alternative A, *affect all body parts* were not aware that any disease can affect any part of the body regardless of it being communicable or non-communicable. Those who chose option B, *causes severe fever* failed to realise that not all communicable diseases can cause severe fever. Those who chose alternative D, *spread by air* were not aware that not all communicable diseases are

spread by air. Similarly, the candidates who selected option E, *are cured by vaccination,* lacked knowledge that vaccination can be employed to protect the body from some communicable diseases.

Further data analysis shows that 34.77 per cent of the candidates chose the correct response C, *Spread very fast.* These candidates knew that communicable diseases can spread from one person to another very fast provided that the agents are within the surroundings. Some of these diseases can spread rapidly thereby affecting many people in a very short time.

Question 31: A Doctor advised Amina to eat food rich in carbohydrates. Which group of food represents such food?

A Rice, potatoes, sorghum and fish.
B Maize, beans, groundnuts and sorghum.
C Wheat, bananas, meat and cassava.
D Potatoes, sugar canes, maize and wheat.
E Rice, potatoes, butter and cashewnuts.

The question tested candidate's competence in identifying types of foods with their respective groups. The data shows that the performance on this question was weak. The question was attempted by 1,350,794 candidates. Among whom 343,530 (25.43%) chose the correct answer and 988,161 (73.15%) chose incorrect options. Figure 20 shows the dispersion of responses and the percentages of candidates for each option.

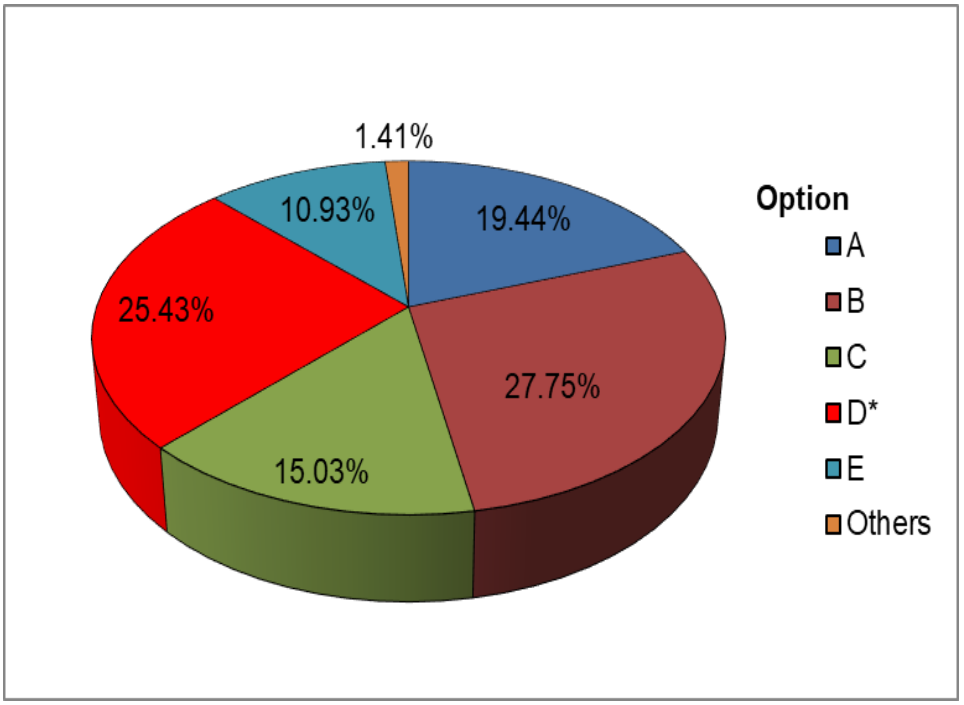


Figure 20: *Candidates' percentages for each option*

Statistics from Figure 20 shows that the correct answer for the question was D*, Potatoes, sugar canes, maize and wheat.*

Data analysis reveals that 73.15 per cent of candidates opted for wrong alternatives A, B, C and E. These candidates lacked competence in identifying types food in their respective groups. For example, those who opted for alternatives A*, Rice, potatoes, sorghum and fish*, B*, Maize, beans, groundnuts and sorghum* and C*, Wheat, bananas, meat and cassava* did not realise that fish, beans, groundnuts and meat are food substances categorized as proteins. Candidates who chose option E*, Rice, potatoes, butter and cashew nuts,* were not aware that butter and cashew nuts contain fats and oils (lipids).

Further analysis shows that 25.43 per cent of the candidates selected the correct response D, *Potatoes, sugar canes*, *maize and wheat.* These candidates understood that the food listed in that option give energy to the body. Such types of food varieties are categorized as carbohydrates.

Question 32: In our society there is a wrong perception whereby patients with tuberculosis are considered to be HIV positive. Why do you think this view is incorrect?

A HIV symptoms are not related to tuberculosis.
B If you are HIV positive you have tuberculosis.
C HIV can be identified through testing.
D Tuberculosis can be cured but HIV/AIDS cannot be cured.
E HIV/AIDS causes tuberculosis.

The question assessed candidates' competence on understanding the best way to identify a person with HIV/AIDS. Data shows that the performance on this question was weak as 287,333 (21.27 %) candidates among 1,350,794 who did the question, chose the correct answer. Moreover, 1,044,286 (77.31%) chose wrong options in this question. Table 12 reveals the percentage of candidates for each option.

Option	**A**	**B**	**C***	**D**	**E**	**Others**
No. of candidates	376810	105300	287333	426823	135353	19175
% of candidates	27.90	7.80	21.27	31.60	10.02	1.42

Table 12: *Candidates' percentages for each option*

From the given data in Table 12, statistics show that the correct answer to this question was C*, HIV can be identified through testing*. Data shows that 77.31 per cent of the candidates failed to answer the correctly the question as they chose distractors A, B, D, and E. These candidates lacked enough competence and understanding of the best way of identifying a person with HIV. For example, candidates who selected alternatives A, *HIV symptoms are not related to tuberculosis*; D, *Tuberculosis can be cured but HIV/AIDS cannot be cured* and E, *HIV/AIDS causes tuberculosis* were not aware that tuberculosis is an opportunistic disease associated with HIV infection in the body. They did not realise that HIV infection destroys the body immunity, making the body susceptible to different diseases including tuberculosis. Those who chose B, *If you are HIV positive you have tuberculosis*, did not know that if an HIV positive victim follows the health principles cannot be easily attacked by tuberculosis.

However, 21.27% of the candidates chose the correct response. These candidates were knowledgeable enough to understand that the only way to identify HIV positive victim is through testing. They also understood that having opportunistic diseases like tuberculosis is not an indicator that a person is HIV positive.

Question 33: Mandevu is a pupil who wears dirty clothes and does not take a bath. According to his habit, what type of disease is he likely to suffer from?

A	Measles	B	Flu
C	Tuberculosis	D	Skin rashes
E	Chickenpox.		

The question assessed candidate's competence to identify the importance of maintaining body cleanliness for good health. The data shows that the performance on this question was good as 909,815 (67.35 %) candidates among 1,350,794 who did the question, chose the correct answer. Moreover, 425,841 (31.53%) chose wrong options. The dispersion of answers and the candidates' percentages for each option is shown in Figure 21.

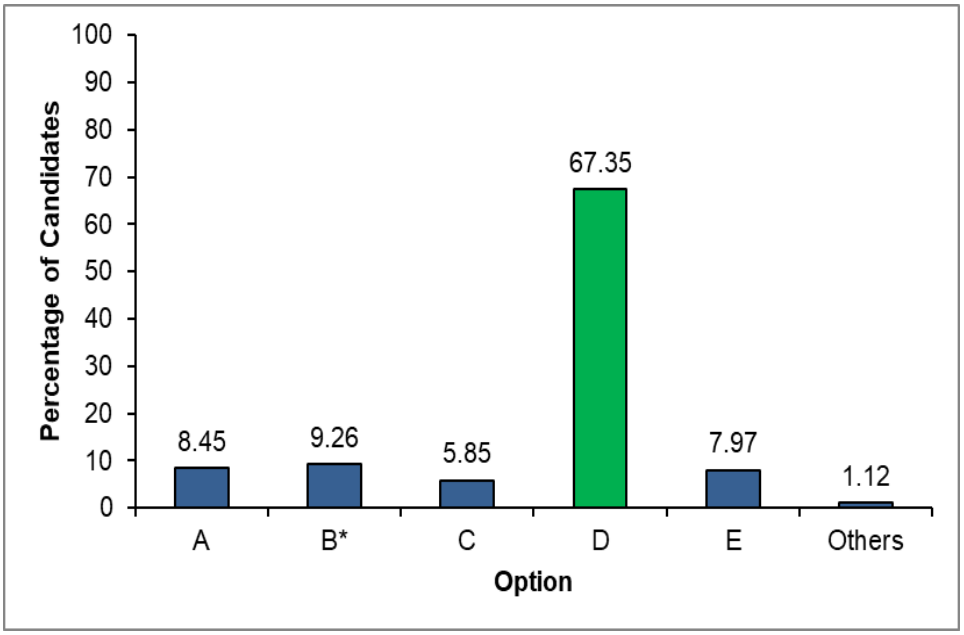


Figure 21: *Candidates' percentages for each option*

Figure 21 above shows that 67.35% of candidates chose the correct response D*, Skin rashes*. These candidates had sufficient competence and knowledge about the fact that cleaning the body keeps it free from disease causing pathogens and makes a person look neat and healthy.

Conversely, 31.53 per cent of the candidates chose distractors A, B, C and E. Those who chose distractor A*, Measles,* B *Flu* and E*, Chickenpox* were not aware that measles, flu and chickenpox are infectious diseases caused by virus and not the dirty. Those who chose alternative C, *Tuberculosis* could not understand that tuberculosis is an airborne infectious disease caused by bacteria.

Question 34: Children need food for body building and growth. Which group represents such food?

A Rice, beans, fish, mineral salts, spinach and mango.
B Water and minerals, rice, fish, spinach and pawpaw.
C Ugali, beans, milk, bread and an orange.
D Meat, fish, eggs, milk and beans.
E Rice, mushroom, minerals, meat, spinach and an orange.

The question assessed the candidates' competence in identifying types of food with their respective functions in the body. The data shows that the performance on this question was average. It is shown that out of 1,350,794 candidates who did the question, among them, 686,085 (50.79%) candidates chose the correct answer and 647,264 (47.91%) chose wrong options. Figure 22 reveals the percentage of candidates on each option.

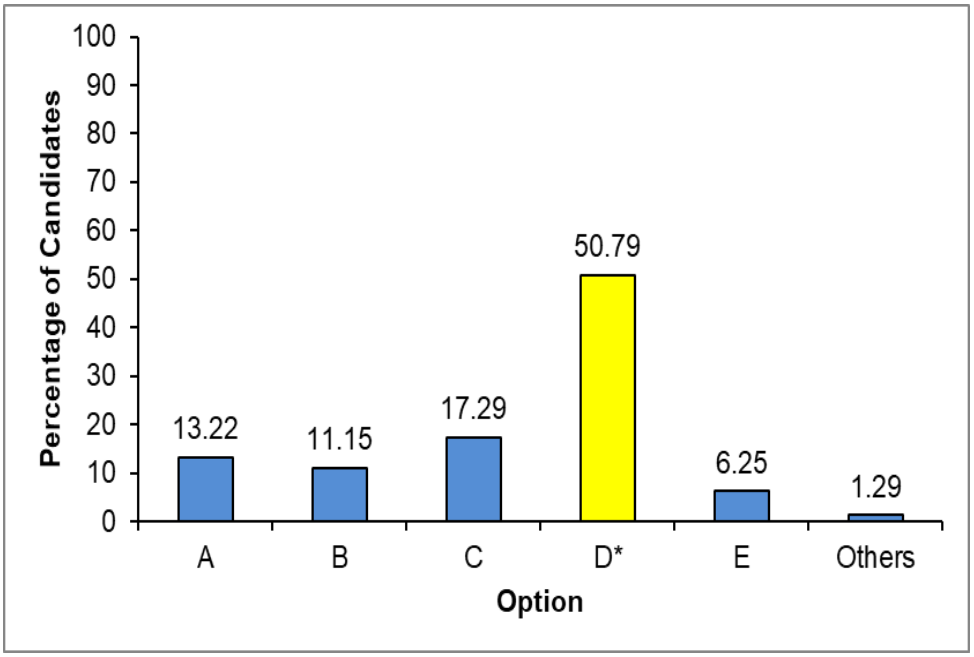


Figure 22: *The percentages of candidates for each option*

Statistics from Figure 22 illustrates that 50.79 per cent selected the correct response D*, Meat, fish, eggs, milk and beans.* Candidates who opted for the correct answer had enough competence and understood that the types of food listed are categorized as proteins. Foods rich in proteins are the ones used for body building, repair and growth. Being used for body building and growth thus why are needed mostly by the children who are still growing.

On the contrary, 47.91% candidates opted for the wrong alternatives A, B, C and E. Those who opted for alternative A*, Rice, beans, fish, mineral salts, spinach and mango*; B*, Water and minerals, rice, fish, spinach and pawpaw;* C*, Ugali, beans, milk, bread and an orange* and E*, Rice, mushroom, minerals, meat, spinach and an orange,* were not aware that there were other types of food such as rice, ugali and bread which are grouped into carbohydrates. These types of food give energy to the body. Likewise, they could not realise that food varieties like mangoes, pawpaws, oranges and spinach belong to a group of vitamins. Moreover, those candidates failed to recognise the presence of water which regulates body temperature and mineral salts which are required by living organisms to maintain balance of the body fluids, activation of enzymes and transmission of

impulses. This was evident that candidates who chose the distractors with the types of food which are not concerned with body building and growth lacked enough knowledge of the types of food in relation to their body functions.

Question 35: Which group of tools that we use in our daily lives but if misused can contribute to the spread and increase of HIV infections?

A Razor blade, pin and a pair of scissor.
B Razor blade, pin and sharpener.
C Razor blade, pin and comb.
D Knife, sharpener and comb.
E Razor blade, pin and comb.

The question assessed the competence of the candidates in identifying tools or objects that contribute to the spread of HIV infections. The data shows that the performance on this question was good. The question attempted by 1,350,794 candidates whereby 970,393 (71.84%) candidates chose the correct answer, and 363,921 (26.94%) candidates chose wrong options. Figure 22 shows the dispersion of candidates' answers and the percentages on each option on question 35

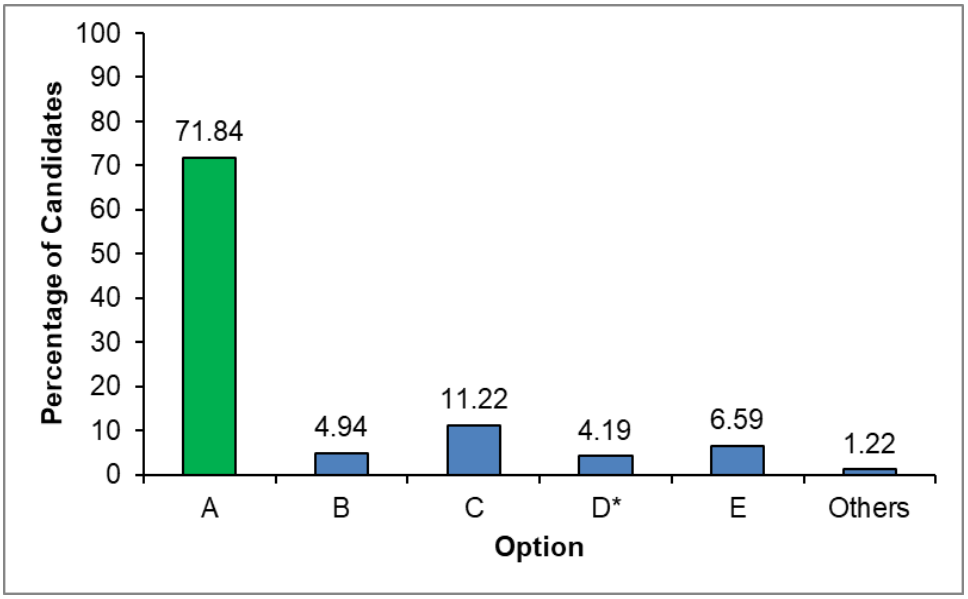


Figure 23: *The percentages of candidates for each option*

The data in Figure 23 shows that 970,393 (71.84%) candidates were competent to respond correctly to this question as they opted for distractor A, *Razor blade, pin and a pair of scissors.* These candidates understood that those are sharp objects which can spread HIV/AIDS.

However, 26.94 per cent of the candidates who chose alternatives B, C, D and E lacked enough knowledge about the ways that contribute to the spread and increase of HIV infection. For example, candidates who opted for distractors B, *Razor blade, pin and sharpener*; C, *Razor blade, pin and comb*; D, *Knife, sharpener and comb* and E, *Razor blade, pin and comb* did not know that there were other tools like a sharpener which is enclosed in a special case to protect the user. Thus, it is impossible for a person to cut and the comb is not sharp such tools do not spread HIV infection. Those responses indicate that the candidates lacked sufficient knowledge of the objects that contribute to the spread and increase of HIV infection.

Question 36: Mr Mambo developed sore throat, headache and experienced bleeding from nose, ear and mouth. What disease do you think Mr Mambo was suffering from?

A Malaria B Meningitis C Ebola
D Covid 19 E Cholera.

The question assessed the competence of the candidates to identify different symptoms of epidemic diseases. Statistics indicate that the performance on this question was good since 830,729 (61.50%) candidates out of 1,350,794 chose correct answer and 503,542 (37.28%) candidates chose wrong options. Figure 24 shows the dispersion of answers and the candidates' percentages for each option in this question.

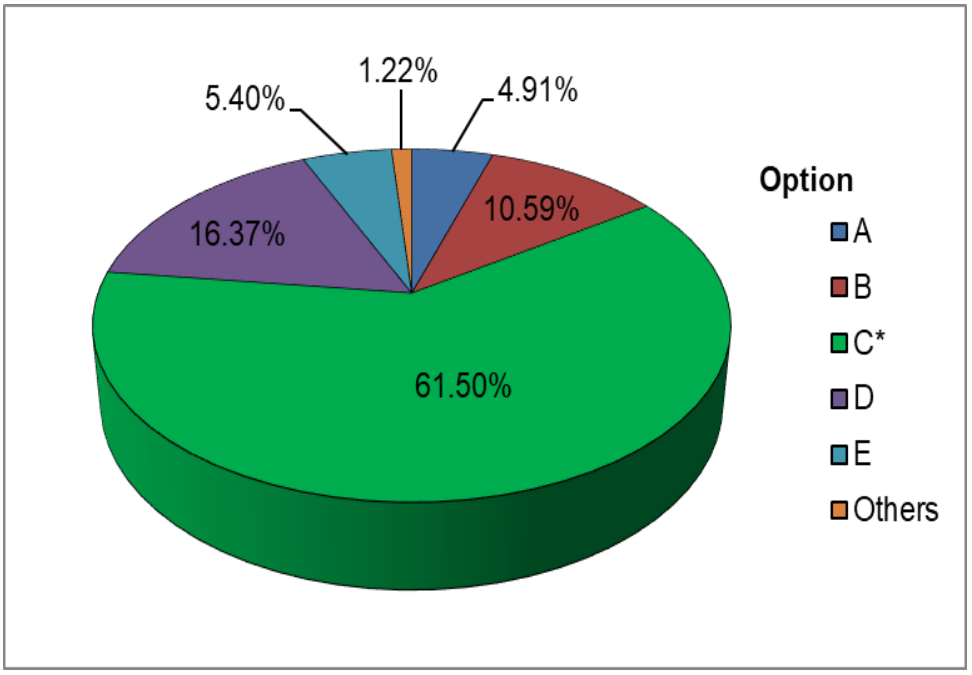


Figure 24: *Candidates' percentages for each option*

Statistics from Figure 24 show that 830,729 (61.50%) candidates chose the correct alternative C*, Ebola.* Those candidates knew the different symptoms of different epidemic diseases including Ebola.

However, 37.28 per cent of candidates who failed this question lacked enough knowledge about the symptoms of different diseases as they opted for the wrong alternatives A, B, D and E. For instance, those who opted for alternative A, *Malaria*, failed to understand that some of the symptoms of malaria include fever, nausea, loss of appetite, vomiting, sweating, feeling cold and shivering. Those who selected alternative B, *Meningitis* did not realise that the symptoms of meningitis include high fever, vomiting, muscle cramps and a stiff neck. Candidates who opted for D, *Covid-19* were not aware that Covid-19 is associated with chest pain, fever, loss of appetite, fatigue and coughing. Those who opted for E, *Cholera* did not understand that cholera is associated with watery diarrhoea which looks like "rice water", vomiting, thirst and leg cramps. Therefore, symptoms of malaria, meningitis, covid-19 and cholera are not associated with bleeding from the nose, ear and mouth.

Question 37: What example would you use if you want to explain to your fellow about physical change?

A Souring milk B Rusting of iron.
C Burning a piece of paper D Melting of ice.
E Cooking of food.

The question measured the candidates' competence in understanding chemical and physical change of matter. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 660,004 (48.86%) responded correctly and 673,676 (49.88%) failed. Figure 24 shows candidates' percentage on each option.

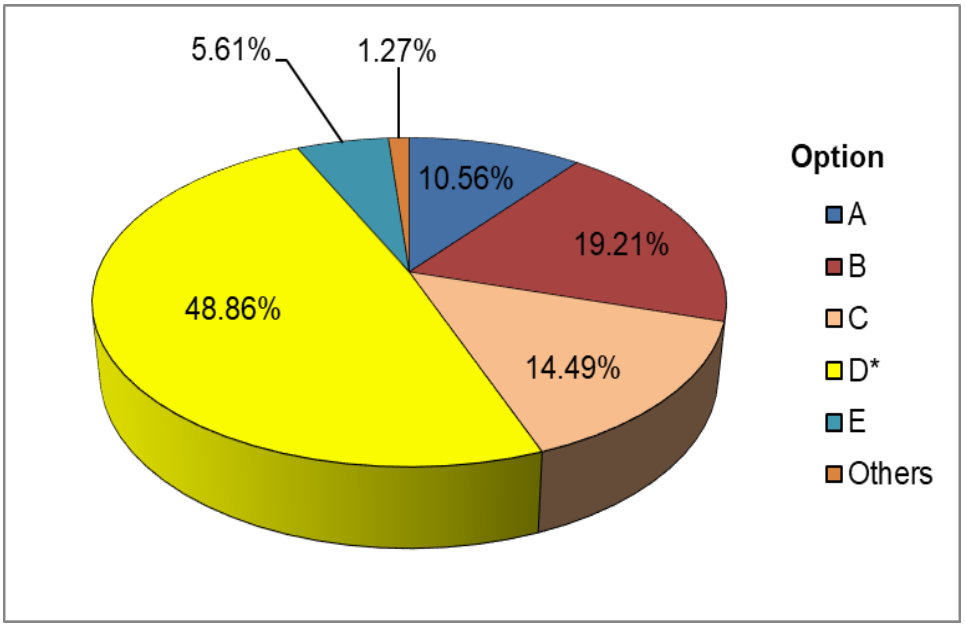


Figure 25: *The percentages of candidates in each option*

Data from the Figure 25 shows that, the correct alternative was D, *Melting of ice.* 49.88 percent of candidates failed to provide the correct response to the question. This made the general performance on the question to be average.

Candidates who chose incorrect responses A, B, D and E lacked enough understanding of the concept of physical and chemical changes of matter. For instance, those who opted for A, *Souring milk*

did not understand that fresh milk undergoes chemical reaction and becomes sour. Candidates who chose B, *Rusting of iron* did not understand that when iron comes in contact with air and water it reacts to form rust. Those who opted for C, *Burning a piece of paper* did not understand that smoke and ashes are produced as a result of burning a piece of paper where a new product which cannot be reversed to pieces of paper. Those who opted for E, Co*oking of food* could not understand that when heat is supplied to uncooked food chemical change occurs and cooked food is formed. Cooked food is new product which cannot be changed back to its origin form.

On the other hand, the data reveals that 48.86 per cent of candidates chose the correct answers. These candidates realised that physical change is the one that does not produce a new chemical substance. It only changes the state of matter. This enabled them to opt for correct alternative as they understood that when temperature increases ice change from solid to liquid without changing its chemical composition.

Question 38: Which one is the correct arrangement of the states of matter based on the molecular forces from lowest to highest?

A solid, gas, liquid.
B liquid, solid, gas.
C gas, liquid, solid.
D solid, liquid, gas.
E liquid, gas, solid.

The question assessed candidates' competence in identifying characteristics of states of matter. Analysis shows that a total of 1,350,794 candidates did the question. Out of whom 330,687 (24.48%) candidates did it correctly. and 999,894 (74.03%) candidates did it wrongly. The general candidates' performance on this question was weak. Figure 26 reveals.

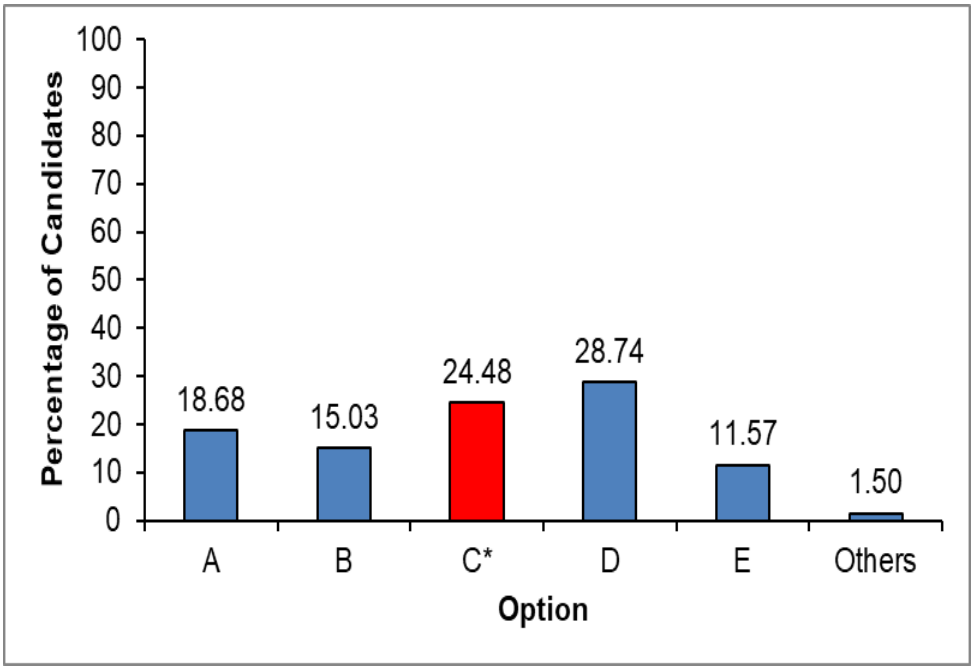


Figure 26: *Candidates' percentages for each option*

Figure 26 indicates that the candidates who opted for A, B, D and E lacked the competence and knowledge of properties of the three states of matter in terms of the weak, moderate and strong forces of attraction in correct arrangement. They did not realise that, a physical state which has weak intra-molecular forces, its molecules are free and they spread in a large area like gases. Also, the one with moderate intramolecular forces, its molecules are moderately free and this happens in liquid matters. The ones with very strong intramolecular forces, whose molecules are held together with very strong force as seen in solid matter.

However, Figure 26 indicates that 24.48 per cent of candidates opted for the correct response, gas, liquid and solid. These candidates had enough understanding that gas has weak intramolecular forces whereas liquid has moderate intramolecular forces and solid has strong intramolecular forces.

Question 39: A standard seven pupil was provided with a solution to be identified. She put few drops of it on a red litmus paper which changed its colour to blue. What was in the solution?

A Acid B Base C Vinegar
D Sugar E Carbonate.

The question assessed the candidates' competence in understanding the properties of acids and bases using litmus paper. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 402,535 (29.87%) responded correctly and 931,713 (68.98%) failed. The general performance of the candidates on this question was weak. Table 13 shows candidates' percentages for each response.

Option	A	B*	C	D	E	Others
No. of candidates	747391	403525	60296	66215	57811	15556
% of candidates	55.33	29.87	4.46	4.90	4.28	1.15

Table 13: *The percentages of candidates for each option*

Statistics from the Table 13 reveals that the correct answer for the question was B, *Base.* The percentage of the candidates who chose wrong alternatives was 68.68. This made the general performance of the question to be weak.

The candidates, who failed to choose correct response chose distractors A, C, D and E. These candidates lacked enough understanding of the properties of acids and bases using litmus paper. For example, those who opted for A, *Acid* and C, *Vinegar* could not understand that acids and vinegar change blue litmus paper to red. Candidates who chose D, *Sugar* did not understand that sugar is a neutral solution and so the litmus paper will retain its colour. Likewise, those who chose E, *carbonate,* were not aware that some of the carbonates do not dissolve in water to make a solution.

Further analysis indicates that 29.87 per cent of the candidates chose the correct response B, *Base.* These candidates understood

that base changes red litmus paper to blue. Thus, they were able to realised that the solution was base.

Question 40: Five nails were kept in five different containers. Which experiment will give positive results for rusting?

A The one with the nail which is smeared with lubricant.
B The one with nail and closed after the water was boiled.
C The one with the nail which is smeared with cooking oil.
D The one with nail, moisture and left opened.
E The one with nail, boiled water and with oil.

The question assessed the candidates' competence in identifying the necessary conditions for rusting and how to prevent it. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 740,552 (54.82%) responded correctly and 574,726 (43.68%) failed. The general performance of candidates on this question was average. Figure 27 shows candidates' percentage for each option in this question.

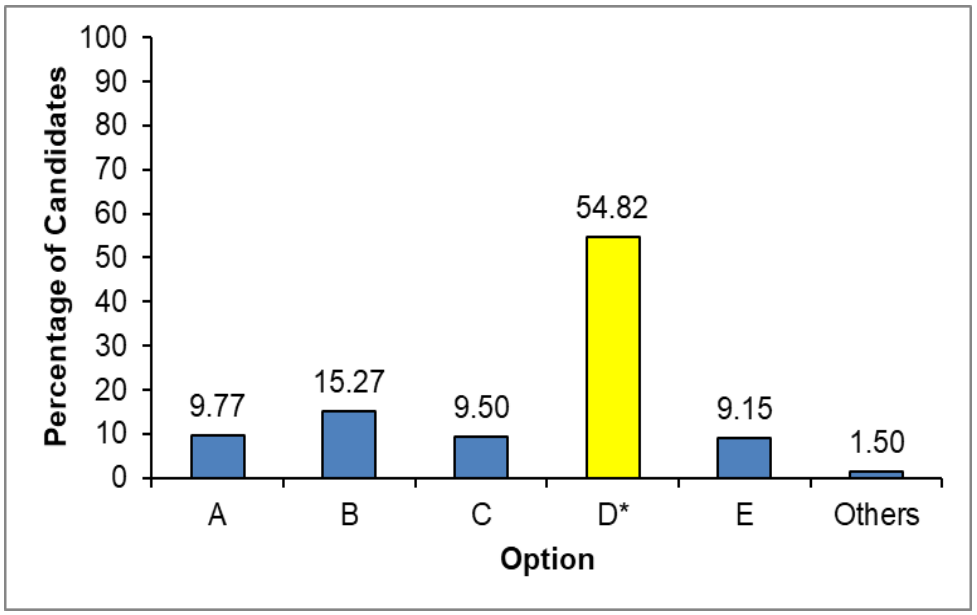


Figure 27: *The percentages of candidates for each option*

Statistics from Figure 27 show that 54.82 per cent of the candidates selected the correct alternative D, *The one with nail, moisture and left opened*. These candidates understood the necessary conditions for rusting which are iron, water and air. Therefore, they understood that with these conditions the nail will rust.

Further analysis indicates that 43.68 per cent of the candidates chose incorrect responses A, B, C and E. These candidates lacked enough understanding of the necessary conditions for rusting and how to prevent it. For example, those who opted for A, *The one with the nail which is smeared with lubricant* and C, *the one with the nail which is smeared with cooking oil* failed to understand that lubricants and oil prevent air and nail to come in contact. Moreover, the candidates who chose B, *The one with nail and closed after the water was boiled* did not understand that boiling removes dissolved air in water and the stopper prevents air from entering the container. Similarly, those who chose E, *The one with nail, boiled water and with oil* were not aware that boiling removes dissolved air in water and oil prevents atmospheric air to come in the contact with the nail.

2.2 SECTION B: Short Answer Items

Question 41: Study carefully Figure 2 and then answer the questions that follow:

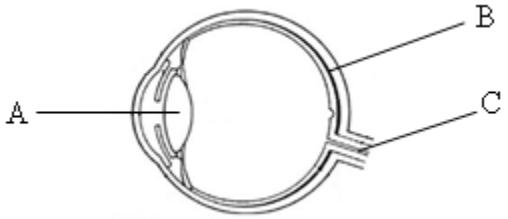


Figure 2

(a) Explain the function of the part labelled with letter C.

(b) What is the relationship of the parts labelled with letter A and B in performing their function?

The question assessed the candidates' competence in understanding the structure and functions of different parts of the eye. The question was attempted by 1,350,794 candidates.

Statistics show that the candidates' performance on this question was weak since 200,062. (14.81%) responded correctly and 1,304,541 (96.58%) responded wrongly to the question. Further analysis of the candidates' performance indicates that most of them (85.19%) scored 0 marks. Figure 28 shows candidates' performance on this question.

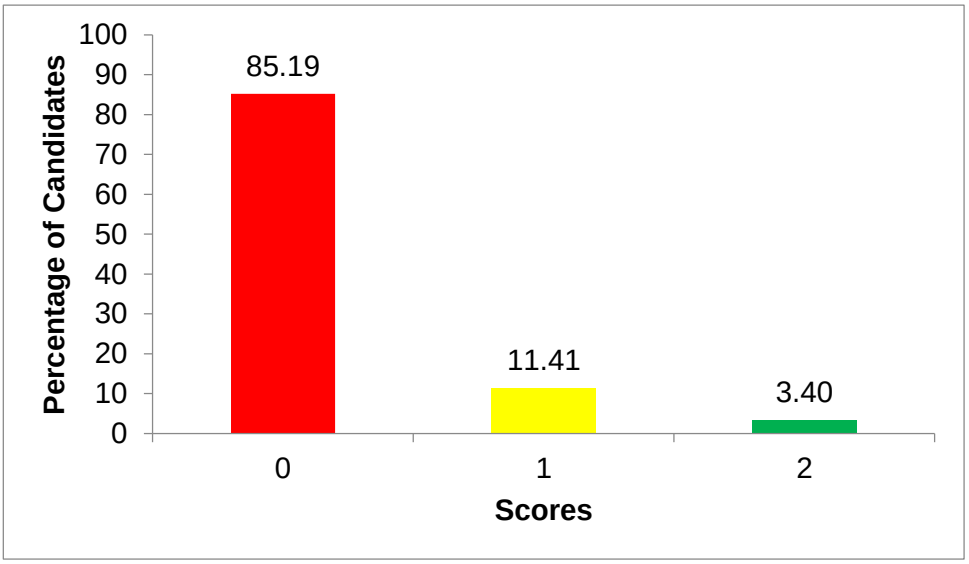
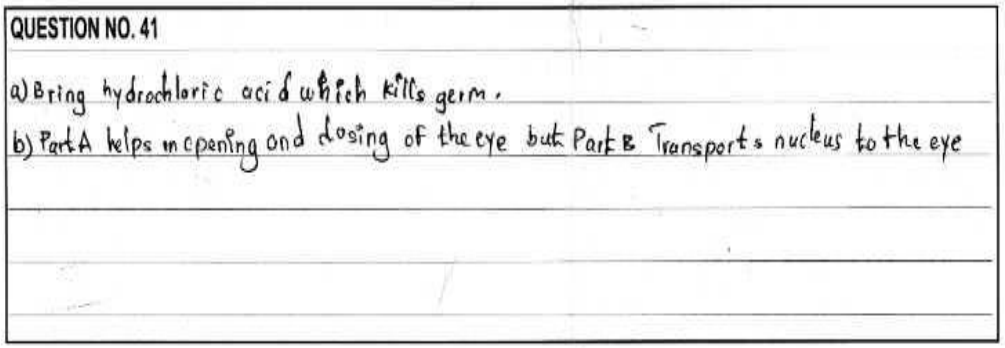


Figure 28: Candidates performance on question 41

Figure 28 indicates that 85.19 per cent of candidates failed t answer the question and scored zero marks that made the general performance of the question to be weak.

The analysis done reveals that, 1,150,441 (85.19%) candidates scored zero marks since they wrote incorrect answers in part (a) and part (b). These candidates lacked knowledge of the function of different parts of the eye. Some candidates wrote functions of other body systems apart from those of the eye. For example, in part (a) one candidate wrote the function of the part labelled C (Optic nerve) as, *"to transport male gamete before it is fertilized"* while in part (b), he/she wrote, *"to store a female gamete before it is fertilized"*. Another candidate wrote, "*to transport male gamete to the uterus"* in part (a) and in part (b) he/she wrote, *"transportation of air*". These responses indicate that the candidates lacked knowledge about

functions of different parts of the eye. Extract 41.1 provides a sample of the incorrect response from one of the candidates.


QUESTION NO. 41

a) Bring hydrochloric acid which kills germ.

b) Part A helps in opening and closing of the eye but Part B Transports nucleus to the eye

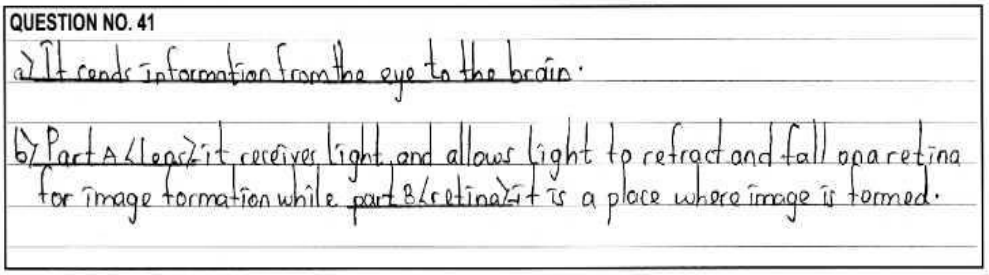
Extract 41.1: *A sample of an incorrect response to question 41*

Extract 41.1 reveals that the candidate related the figure with part of the digestive system, the stomach, as he/she wrote the function of hydrochloric acid in part (a). Also, the candidate did not know how the lens and retina work together.

Analysis of the candidates' responses shows that 154,100 (11.41%) candidates who scored 01 mark, responded correctly in either part, (a) or (b). For example, one candidate who failed in part (a) of the question wrote; "*part C holds the eye"*. The candidate failed to explain the function of the part labelled C (Optic nerve) which sends information to the brain for interpretation. Also, did not understand that muscles are the ones holding the eye and making the eye able to rotate in order to see. Likewise, another candidate who failed in part (b) wrote wrong answers on the relationship between the lens and retina as he/she wrote; *"they make several vibrations".* This candidate did not know that vibrations occur in the ears and not in the eyes. Also, she/he lacked enough knowledge on the functions of different parts of the eye, especially the lens, retina and optic nerve.

Data from Figure 28 indicates that 3.41 per cent of the candidates answered the question correctly and scored 02 marks. These candidates explained the function of the part labelled C (optic nerve) found in Figure 2, in part (a). Also, in part (b), they explained the relationship of the parts labelled with letter A (lens) and B (retina) in

performing their function. This implies that, these candidates were knowledgeable enough to describe the functions of sense organs in the human body, particularly parts of the eye. Extract 41.1 provides a sample of the correct response from one of the candidates.


QUESTION NO. 41

a) It sends information from the eye to the brain.

b) Part A (lens) it receives light and allows light to refract and fall on a retina for image formation while part B (retina) it is a place where image is formed.

Extract 41.2: *A sample of a correct response to question 41*

Question 42: It has been known that renewable energy is better than all the other types of energy. Give two weaknesses of renewable energy.

The question tested the candidates' competence in understanding renewable energy specifically in identifying its weaknesses. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 45,501 (3.00%) responded correctly and 1,310,003 (96.98%) failed to respond correctly. Statistics show that 88.29 per cent of candidates scored 0 to 0.5 marks. Figure 29 shows candidates' performance on this question.

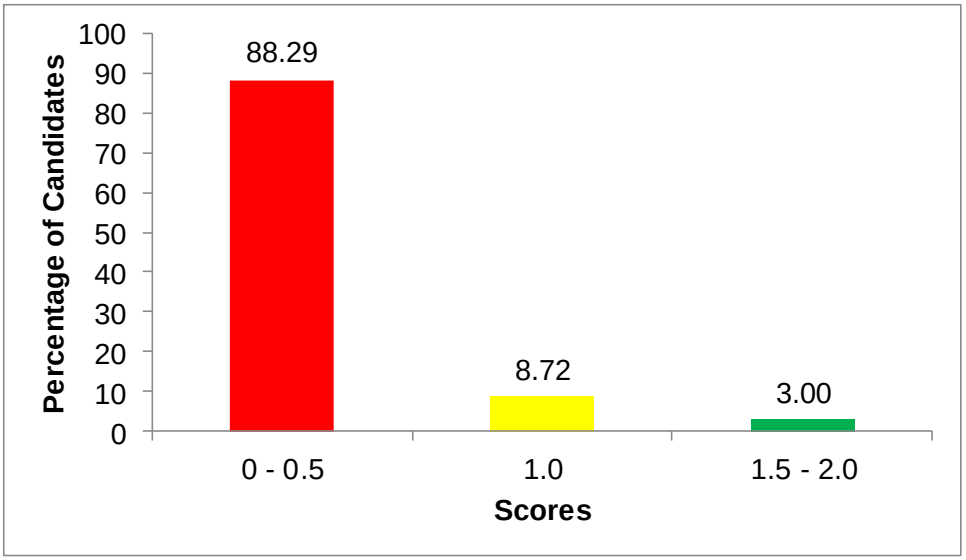
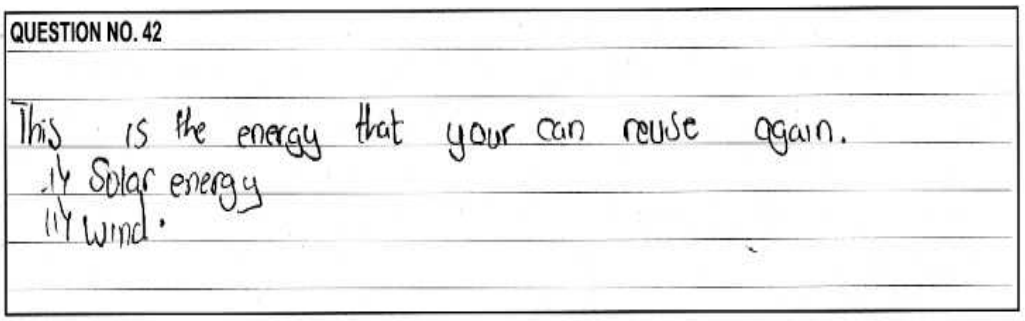


Figure 29: *Candidates' performance on question 42*

Figure 29 show that 96.98 per cent of the candidates failed the question. That made the general performance of the question to be weak.

The analysis done reveals that 1,186,155 (88.29%) candidates scored 00 to 0.5 marks on this question since they wrote incorrect answers. These candidates lacked competence and the knowledge about renewable energy especially its weaknesses.

Candidates' responses show that, some scored 0.5 to 1.5 marks for different reasons; for example, some of them wrote *"Increase of heat to the atmosphere"*. These candidates were not knowledgeable that carbon dioxide is responsible for the increase of temperature in the atmosphere. Renewable energy produces a very small amount of carbon dioxide compared to other sources of energy such as coal. Similarly, some of them wrote *"renewable energy pollute environment"* as they were not aware that renewable energy has insignificant harmful effects to the environment and organisms. Also, it involves permanent sources which do not pollute the environment. Extract 42.1 provides a sample of an incorrect response from one of the candidates.

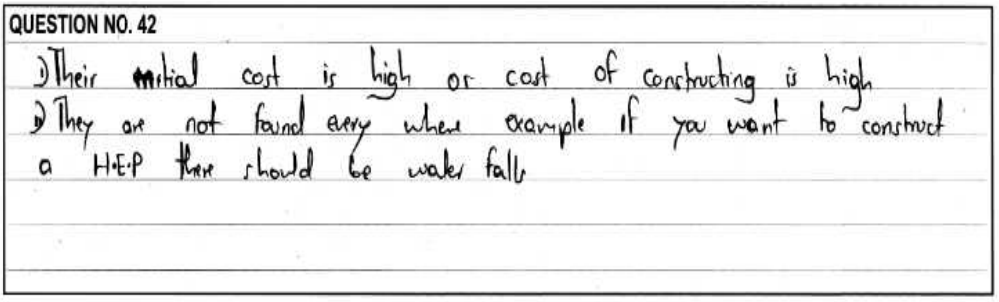

QUESTION NO. 42

This is the energy that your can reuse again.
- Solar energy
- Wind.

Extract 42.1: *A sample of an incorrect response to question 42*

In extract 42.1, the candidate wrote advantage and examples of renewable energy instead of its weaknesses.

Statistics in Figure 29 shows that 37,525 (2.8%) candidates answered the question correctly and scored all 02 marks allocated to the question. These candidates wrote the weaknesses of renewable energy correctly. They understood that renewable energy originates from natural sources such as sunlight, wind, water waves, waterfalls and biogas. Its technologies totally depend on weather. In case atmospheric conditions are not favourable, then the production of renewable energy is limited. Moreover, the candidates were knowledgeable that the investment costs of exploiting renewable energy are initially high. Extract 42.1 provides a sample of the correct response from one of the candidates.


QUESTION NO. 42

i) Their initial cost is high or cost of constructing is high
ii) They are not found every where example if you want to construct a H.E.P there should be water fall.

Extract 42.2: *A sample of a correct response to question 42*

Question 43: Juma is a pupil who is learning to use Microsoft word program but he does not know how to save the document typed for the first time. Which four steps would you advise him to follow sequentially so as to enable him to save the document?

The question assessed the candidates' competence to use Microsoft word program in saving a document that was typed for the first time. The question was attempted by 1,350,794 candidates. Statistics show that the candidates' performance on this question was weak since only 5,594 (2.8%) responded correctly and 1,340,440 (99.23%) failed. Further analysis of the candidates' performance indicates that many candidates 1,331,888 (98.62%) scored between 0 to 0.5 marks. Figure 30 shows the candidates' performance on this question.

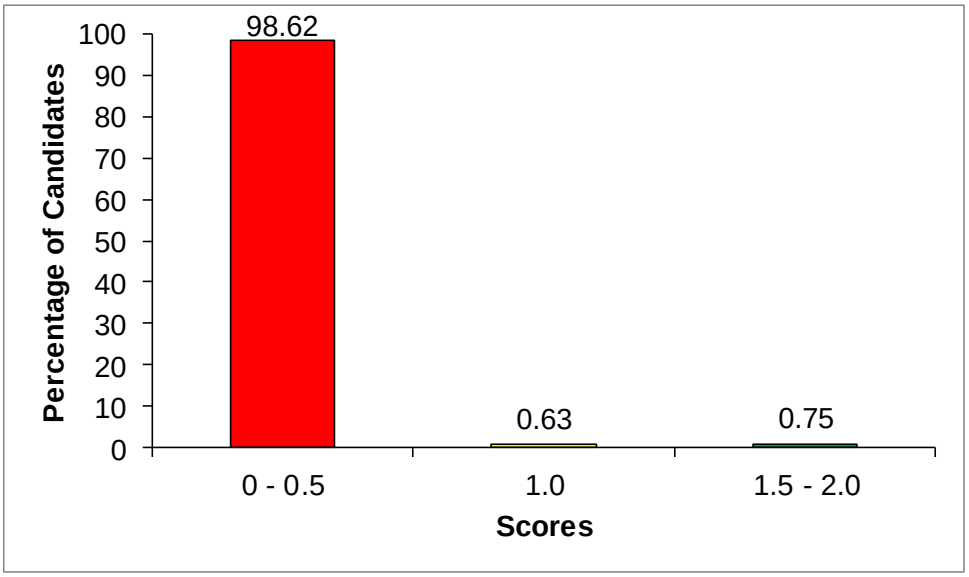
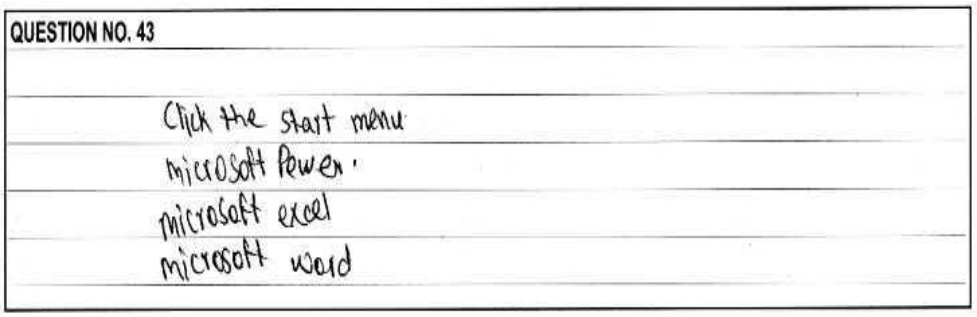


Figure 30: *Candidates' performance on question 43*

Figure 30 show that, 98.62 per cent of the candidates failed the question. These candidates scored 00 to 0.5 marks. That made the general performance of the question to be weak

Candidates who scored zero (00) marks, lacked knowledge about the Microsoft word program because they failed to write the correct steps in saving a document that is typed for the first time. For instance, one candidate wrote the steps as, *"(i) you enter in the program, (ii) you write your document, (iii) you save your document and (iv) after that you put it in your program"*. Another candidate wrote some of the scientific procedures used in conducting a research as follows, *"(i) to know the problem, (ii), data analysis (iii) data collection (iv) conclusion"*. These candidates lacked enough knowledge of the Microsoft word program as they failed to write the steps used to save a document. Some candidates failed to meet the demand of the question as they did not write the steps sequentially as required. Extract 43.1 provides a sample of the incorrect response from one of the candidates.


QUESTION NO. 43

Click the start menu
microsoft Power.
microsoft excel
microsoft word

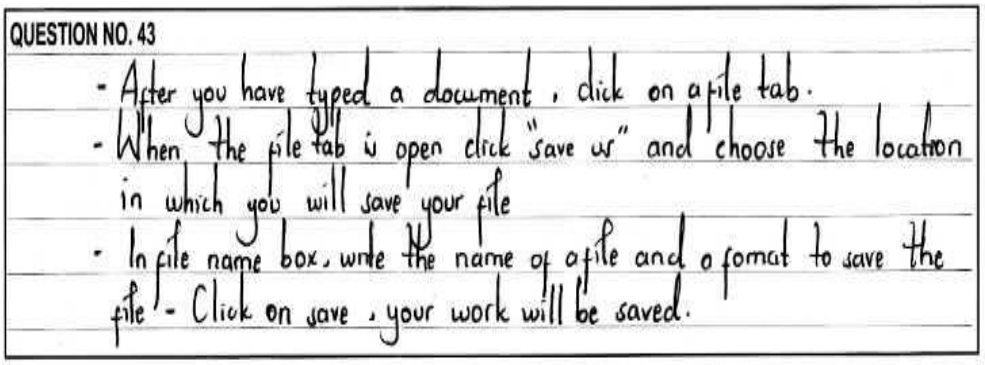
Extract 43.1: *A sample of an incorrect response to question 43*

Extract 43.2 indicates that the candidate wrote the Microsoft programs instead of the four steps used to save a document typed for the first time.

Analysis of the candidates' responses reveals that 1,344,910 (99.56%) candidates, who scored 0.5 to 1.5 marks, were able to write only the first few steps in saving a word document. Such candidates had inadequate knowledge about the use of the Microsoft word program.

Figure 30 demonstrates that only 5,594 (0.41%) candidates answered the question correctly and scored all two (02) marks. These candidates understood what Microsoft word program is as they wrote the correct steps to save a word document that is typed

for the first time. Extract 43.2 provides a sample of the correct response from one of the candidates.


QUESTION NO. 43

- After you have typed a document, click on a file tab.
- When the file tab is open click "save as" and choose the location in which you will save your file
- In file name box, write the name of a file and a format to save the file - Click on save, your work will be saved.

Extract 43.2: *A sample of a correct response to question 43*

Question 44: Baraka's mother used a pair of scissor to cut a piece of cloth and sewed the cloth using a sewing machine. How do the machines used differ from each other?

The question measured candidates' competence in understanding the types of machines.

The question was attempted by1,350,794 candidates. Analysis reveals that 497,613 (36.84%) candidates responded correctly while 852,887 (63.14%) failed. The statistics of the performance on this question are shown in Figure 31.

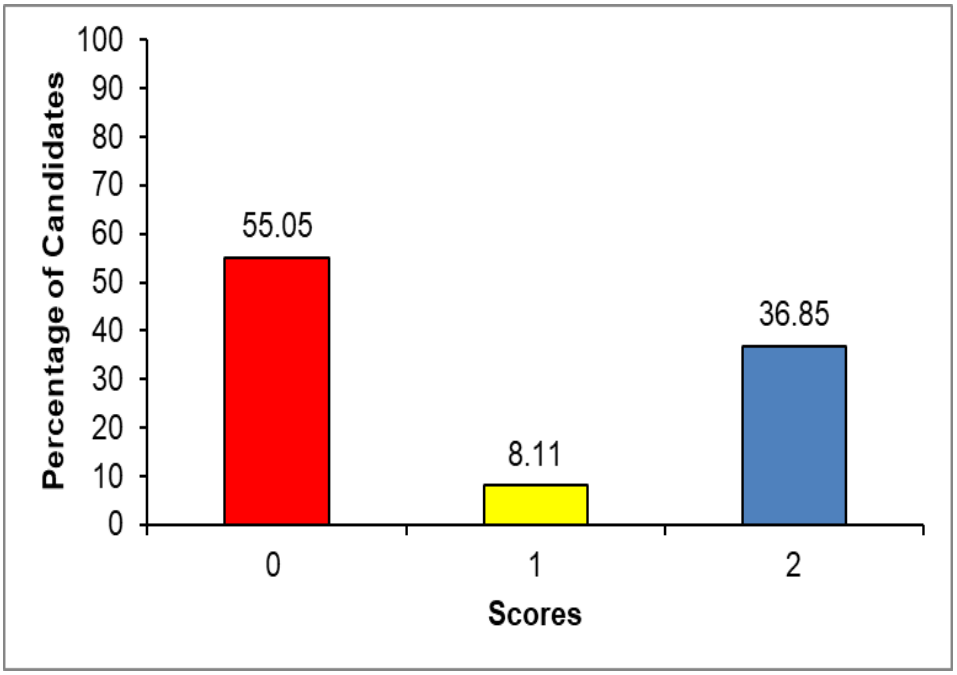
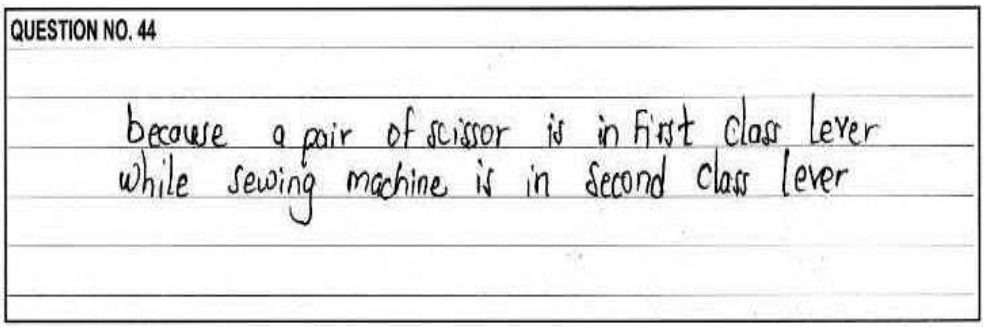


Figure 31: *Candidates' performance on question 44*

Figure 31 reveals that 55.05 per cent of the candidates failed the question and scored 0. This made the general candidates' performance of the question to be weak.

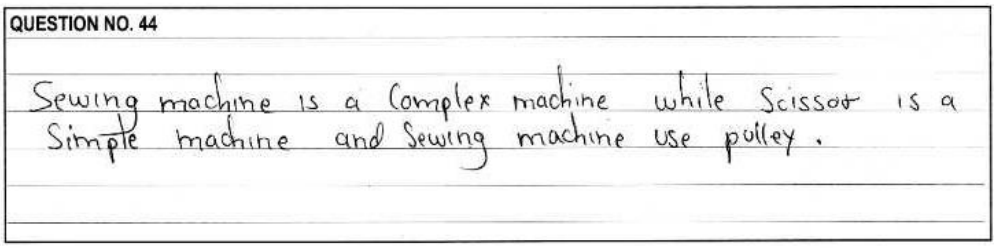
Data analysis shows that 63.18 percent of the candidates scored 00 to 01 marks for different reasons. For example, some of them interchanged the concepts of simple machines and complex machines such as, "*a pair of scissors is a complex machine while sewing machine is a simple machine"*. These candidates used a concept of simple and complex machines interchangeably. Other candidates wrote that, "*a sewing machine is used to simplify work while a pair of scissors is used to cut things*". These candidates did not realise that both the sewing machine and pair of scissors are machines used to simplify work. Likewise, some candidates gave irrelevant responses such as, a *"sewing machine is a machine that sews clothes very fast*". These candidates did not differentiate a pair of scissors from a sewing machine. Extract 44.1 presents a sample of an incorrect response.



Extract 44.1: A *sample of an incorrect response to question 44*

In extract 44.1, the candidate differentiated a pair of scissors and sewing machine as if they were levers. This candidate did not understand that a sewing machine is not a lever. It is a machine that is made up of more than one simple machine.

Further analysis indicates that 36.84 per cent of the candidates answered the question correctly and scored 02 marks. These candidates were able to explain that a pair of scissors is a simple machine while a sewing machine is a complex machine. Also, they understood that complex machines are made up of two or more simple machines. For a example, a sewing machine is made up of simple machines like; needle, wheels and belt all mounted together. Extract 44.2 is a sample of a correct response.



Extract 44.2: *A sample of a correct response to question 44*

Question 45: When Standard Seven Pupils came from the holiday, they found window nets, iron bars and everything of iron nature had turned into brownish colour. What two things caused the occurrence of this change?

The question assessed the candidates' ability to identify the necessary conditions for rusting and the ways to prevent prevent it. The question was attempted by 1,350,794 candidates. Analysis of the candidates' performance indicates that 818,584 (61.34%) responded correctly and 521,920 (38.64%) failed to respond correctly. Figure 32 shows the dispersion of marks on this question.

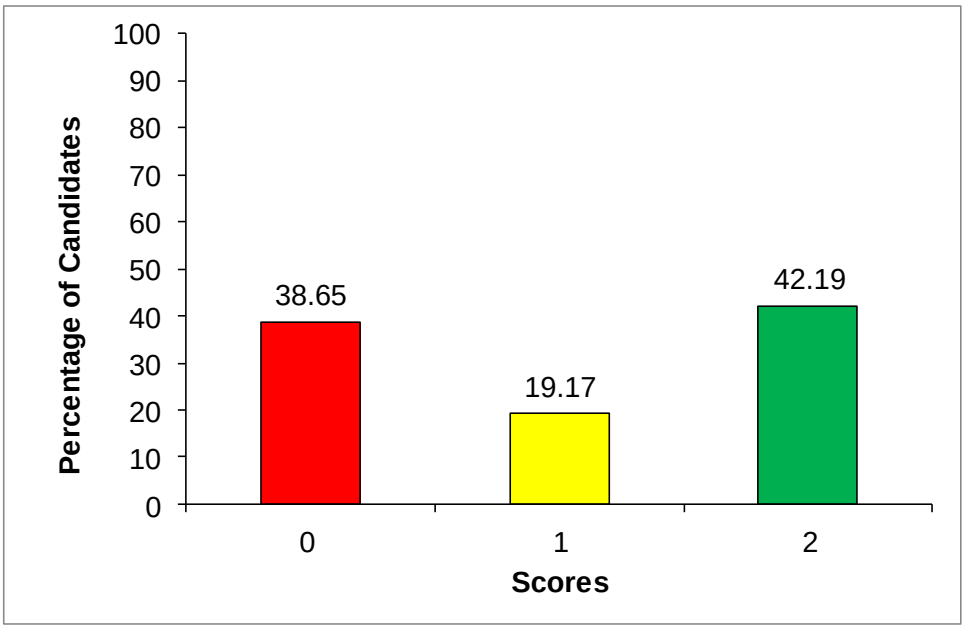
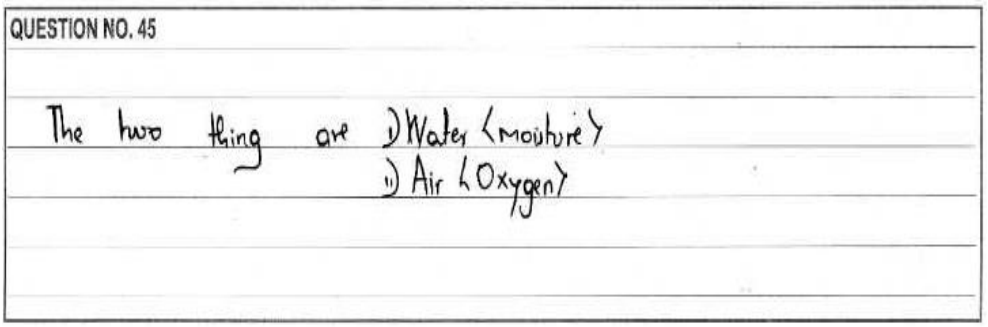


Figure 32: *Candidates' performance on question 45*

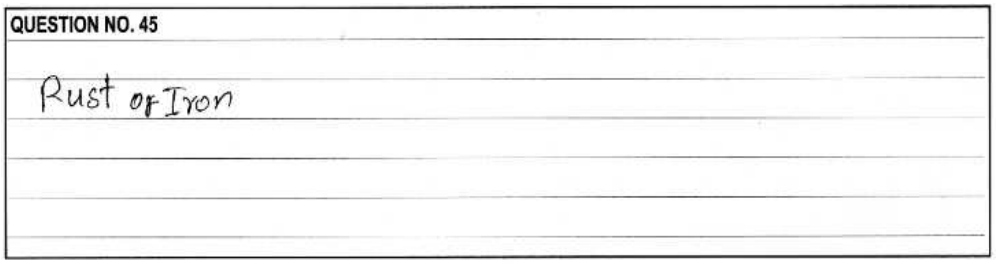
Figure 32 shows that 61.34 per cent of the candidates responded correctly to the question and scored 01 to 02 marks and hence made the performance for the question be good.

The data shows that, many candidates scored 01 to 02 marks. Statistics in Figure 32 shows that 61.34 per cent of the candidates answered the question correctly. These candidates understood that, the brownish layer formed on the surface of iron is rust. Hence, they wrote correctly, two necessary conditions for rust to occur which are water and air. Extract 45.1 provides a sample of a correct response from one of the candidates.



Extract 45.1: *A sample of a correct response to question 45*

However, 38.64 per cent of candidates scored 00 due to lack of understanding of the necessary conditions for rusting to occur. For instance, some of the candidates wrote the condition for iron to rust is "*iron to stay for a long time*" as they did not understand that iron can stay for a long time without rusting, provided that there is no contact with water and air. Also, some wrote "*Osmosis"* since, they did not have knowledge that osmosis is the movement of water molecules from low solute concentration to the high solute concentration region across semi-permeable membrane. Likewise, those who wrote *"carbon dioxide"* did not understand that carbon dioxide does not react with iron to form rust. Extract 45.2 provides a sample of an incorrect response from one of the candidates.



Extract 45.2: *A sample of an incorrect response to question 45*

In Extract 45.2, the candidate wrote the name of brownish compound formed on the surface of iron as rust. However, the candidate did not give the necessary conditions for rust to occur which are water and air.

3.0 CONCLUSION

The Overall performance of the candidates in the Science and Technology subject in 2022 Primary School Leaving Examination (PSLE) was good since 965,600(71.63%) candidates passed the examination. The analysis conducted on the candidates' responses indicated that good performance of some candidates was attributed to factors such as: being competent in the tested concepts, good understanding of the questions' demand and sufficient computing skills. On the contrary, weak performance to some of candidates was due to failure of candidates to understand respective questions, insufficient or lack of enough competence in various concepts and lack of sufficient skills in computation.

4.0 RECOMMENDATIONS

The following recommendations are made in order to improve the candidates' performance in future examinations:

(a) In conducting a lesson pertaining to the competence of *Identifying the Scientific and Technological Theories s*pecifically, in identification of liquids which *are acids and bases,* teachers are advised to guide pupils practically to identify properties of acid and base using indicators. This can be achieved by conducting simple experiments such as putting a red or blue litmus paper into liquids which are acidic (citrus juice, lime juice, vinegar) or basic (ashes, soaps, dry banana leaves, bile). Teachers should use the local available materials such as light white plain paper, hibiscus flowers, a piece of soap, water and lemon to prepare a litmus paper so as to make the learners able to identify properties of both acidic and basic liquids.

(b) In teaching the competence of *Applying Information and Communication Technology (ICT),* teachers are advised to use available resources such as computer, tablets, smartphones with installed office programs to teach the concept of Microsoft word and excel. This will help pupils to learn through observation. As a result, they will have long-term memory of what they learned.

(c) In teaching the competence of *Performing Scientific Experiments Correctly,* especially the concept of *physical* and *chemical changes*, teachers should use improvised and locally available materials such as ice, papers, milk, candle and iron in doing simple experiments to distinguish physical from chemical changes. Ultimately, this will improve students' performance in future examinations.

(d) For the competence of *Identifying Various Systems in the Human body,* teachers should use charts and models of different organs to discuss the role of each organ. For example, heart models, eye models, ear models, skin models and different body systems like urinary system, blood circulatory system, nervous system and reproductive system. This will help pupils to comprehend and retain the concept for a long time.

(e) When teaching competence on *Mastering Scientific Skills*, particularly the concept of *machine,* teachers should use locally available materials such as a pair scissors and sewing machines to explain the concepts of simple machine and complex machine. This will help pupils to understand and have long term memory.

(f) In teaching the competence of *Identifying Various Types of Energy and their Uses, s*pecifically the concept of *work* and *Ohm's Law,* teachers should give the pupils various exercises which demand them to practice using different formula in calculating missing entities such as force, distance, mechanical advantage, voltage, resistance and current. This will improve computing skills of the candidates regarding force, distance, mechanical advantage, voltage, resistance and electric current.

APPENDIX

COMPARISON OF CANDIDATES' PERFORMANCE ON EACH COMPETENCE BETWEEN PSLE 2021 AND PSLE 2022

S/N	Specific Competence	PSLE2021				PSLE 2022			
		Performance on each Question		Average Performance (%)	Remarks	Performance on each Question		Average Performance (%)	Remarks
		Question Number	(%) Performance			Question Number	(%) Performance		
1.	Investigation Various Things in the Environment.	7	54.59	52.10	Average	6	22.4	56.50	Average
		8	71.60			7	8.10		
		9	81.48						
		41	64.09						
2.	Identifying Various Types of Energy and their Uses.	5	55.04			10	72.27		
		10	57.77			11	37.99		
		11	54.90			12	34.81		
		12	54.07			13	35.72		
		13	55.00			24	27.13		
		14	38.24			25	30.09		
		23	55.15			26	41.92		
		26	58.79			42	11.71		
		27	57.63						
		29	46.83						
3.	Identifying Scientific and Technological Theories.	15	61.55			14	59.69		
		16	33.36			15	63.60		
		39	12.05			37	48.86		
		40	25.57			38	24.48		
						45	61.34		
4.	Applying Principles of Good Hygiene for Good	3	21.42	51.18	Average	28	63.39	46.08	Average
		31	83.04			29	42.92		
		32	72.54			30	29.32		

	Health and Environment	33	32.22			31	25.43		
		34	72.78			32	21.27		
		35	46.62			33	67.35		
		36	52.82			34	50.79		
		37	54.96			35	71.84		
		42	77.61			36	61.50		
		45	90.72			37	48.08		
		30	73.33						
5.	Identifying Various Systems of Human Body	1	38.64			1	63.39		
		2	21.42			2	42.92		
		4	57.93			3	29.32		
		6	41.37			4	50.50		
		38	22.60			5	34.06		
		44	10.09			8	69.08		
						9	34.81		
						27	42.59		
						41	14.81		
6	Performing Scientific Experiments Correctly	28	58.79			21	78.02		
		24	32.57			39	55.33		
		25	71.06			40	54.82		
		43	37.83						
7	Mastering Scientific Skills	24	32.57			22	22.64		
		25	71.06	43.78	Average	23	43.57	43.67	Average
		43	37.83			44	44.84		
8	Applying Information and Communication Technology	17	39.55			16	38.66		
		18	66.04			17	43.40		
		19	31.60			18	41.66		
		20	15.48			19	60.32		
		21	35.73			20	39.44		
		22	49.17			43	01.38		