



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) 2020

SCIENCE



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PREFACE

The National Examinations Council of Tanzania (NECTA) is pleased to issue the report on Candidates' Item Responses Analysis (CIRA) for the Primary School Leaving Examination (PSLE) 2020 in Science subject. The aim of the analysis is to give feedback to teachers, policy makers, curriculum developers and other stakeholders on how the candidates responded to the examination questions. This is because the quality of the candidates' responses to the questions is among of the indicators of whether the candidates were able or not able to learn effectively in seven years period of primary education.

In general, the report shows the analysis in each question and specifies the challenges faced by the candidates during answering the respective questions. It identifies reasons for the candidates to be able or not able to provide correct responses according to the requirement of the specific question. Some of the reasons for the candidates to respond correctly, include the acquisition of enough knowledge about the tested concepts. On the other hand, some of the reasons that led to candidates' failure to respond correctly, are lack of knowledge on the assessed concepts/content, misunderstanding the task of the question and failure to follow examination instructions or lack of 3R (Reading, Writing and Arithmetic) skills hence, giving responses not related to the asked questions.

The Examinations Council expects that the feedback provided in this report will enlighten education stakeholders on the trend of education in the primary education. Moreover, this feedback will enable the educational stakeholders to identify proper measures to be taken to improve the candidates' performance in future examinations.

Finally, 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.



Dr. Charles E. Msonde
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report is based on the analysis of the responses of the candidates who sat for the Primary School Leaving Examination (PSLE) 2020 in the Science subject. The PSLE is an exit examination that is normally held in the second week of September each year. In this year, the examination was conducted on 07th and 08th October 2020 due to Covid 19 interference to normal school schedules.

The data show that a total of 1,023,950 candidates were registered for PSLE 2020, out of which 1,009,551 (98.59%) sat for the examination. The analysis of performance indicates that 835,361 (82.85%) candidates passed. This performance is a drop of 0.65 per cent when compared to the performance of PSLE of 2019 where 83.50 per cent passed.

The report presents the data and descriptions concerning the performance of the candidates per question and by topics. The questions analysed are divided into sections A and B. The analysis of candidates' responses in section A was done according to their choices: A, B, C, D and E. Possible reasons for candidates' choice is given in each question. The letter of the correct answer has been marked with a star (*) in tables and charts. Furthermore, the percentage of candidates who did not follow instructions on how to answer the questions and those who could not write anything signifying lack of Reading, Writing and Arithmetic (3R) skills, has been included in the analysis under the heading "others" as indicated in the respective tables and charts used in this report.

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

Generally, the report has five sections, namely; introduction, analysis of the candidates' responses in each question, analysis of the candidates' performance in each topic, conclusion and recommendations. The summary of performance per topics is shown in the Appendix at the end of the report. The grouping of candidates' performance is categorised as *good*, *average* and *poor* basing on the following percentage ranges: 60 – 100 = Good, 40 – 59 = Average and 0 – 39 = Poor.

2.0 THE ANALYSIS OF THE CANDIDATES' RESPONSES IN EACH QUESTION

This part of the report analyses the performance of candidates on sections A and B.

2.1 Section A: Multiple Choice Questions

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

Question 1: Which characteristics are for both plants and animals?

- A Respiration, locomotion and photosynthesis.
- B Respiration, reproduction and growth.
- C Growth, reproduction and photosynthesis.
- D Locomotion, reproduction and transpiration.
- E Growth, respiration and photosynthesis.

The question assessed candidates' ability to identify the characteristics of plants and animals. The question was attempted by 1,000,570 (98.99%) candidates out of which 383,921 (37.99%) responded correctly and 616,649 (61.00%) failed to identify the correct response. Figure 1 shows candidates' percentage in each option.

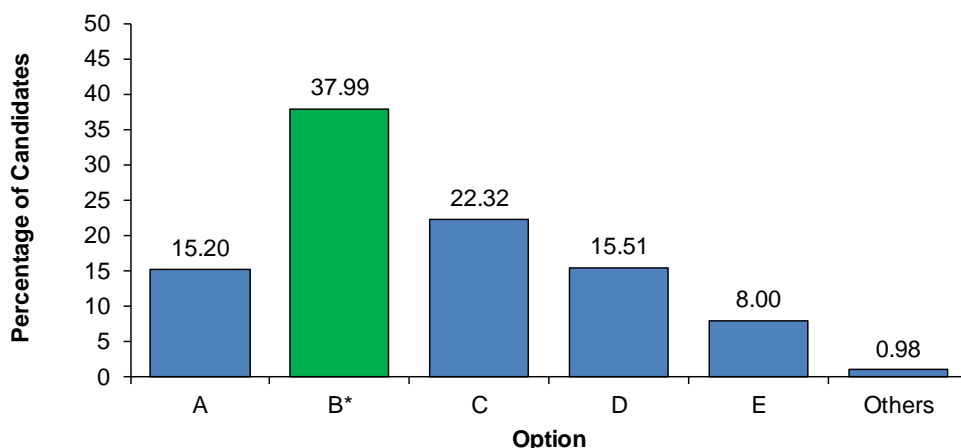


Figure 1: Candidates' Performance in Question 1

Figure 1 shows that more than a half of the candidates (61.00%) failed to identify the correct answer B, *respiration, reproduction and growth*. These candidates lacked enough understanding of the characteristics of living things. They failed to discriminate between the characteristics of all living things (plants and animals) from the characteristic of either plants or animals only. For example, 37.52 per cent of the candidates who chose distractor A, *respiration, locomotion and photosynthesis* and C, *growth, reproduction and photosynthesis*, were oblivious that photosynthesis is the characteristic referring only to plants. It is a process in which plants make their own food. Also, 15.51 per cent of the candidates who chose distractor D, *locomotion, reproduction and transpiration*, did not know that transpiration is an act of losing water which occurs only in plants.

On the other hand, 37.99 per cent of the candidates who answered correctly, had adequate knowledge of the characteristics of living things. They were able to correctly identify the characteristics of living things which apply to both plants and animals.

Question 2: Why the beans farm does **not** require nitrogenous fertilizers?

- A The beans can change nitrogen to nitrate.
- B The beans can change ammonia to nitrate.
- C The beans can change nitrogen to ammonia.
- D The beans can change nitrate to nitrogen.
- E The beans can change ammonia to nitrogen.

The question assessed candidates' understanding of the process used by reguminous plants particularly beans to fertilize the soil. The question was attempted by 998,153 (98.70%) candidates. The performance of the candidates in this question was average as 525,937 (52.05%) candidates responded correctly to the question. On the other hand, 472,216 (46.70%) failed to answer it correctly. Figure 2 summarises the performance of the candidates in this question.

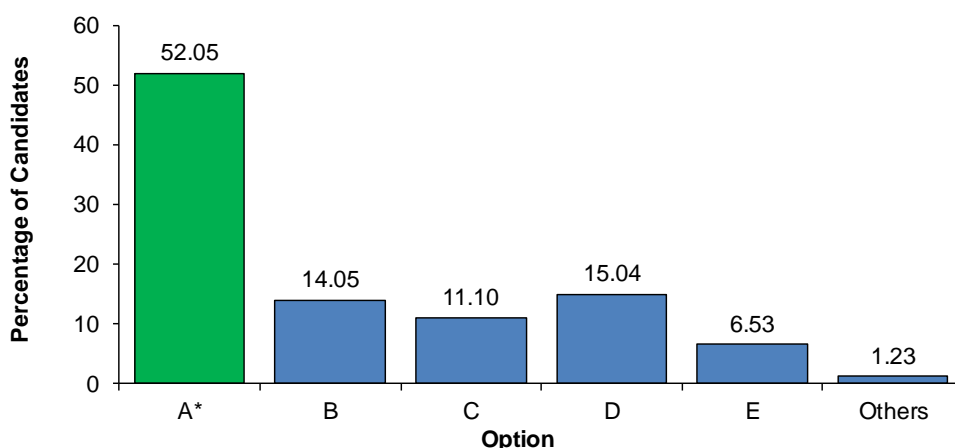


Figure 2: Candidates' Performance in Question 2

As observed in Figure 2, almost half of the candidates (52.05%) chose the correct option A, *the beans can change nitrogen to nitrate*. These candidates had enough knowledge of the way reguminous plants fertilize the soil thus, they do not need nitrogenous fertilizers. They knew that, beans are found in a group of plants that can convert atmospheric nitrogen into nitrates in the soil.

Figure 2 also shows that, 46.70 per cent of the candidates chose among the distractors B, C, D and E. These candidates lacked knowledge of identifying the process used by reguminous plants to make nitrates in the soil. For example, the candidates who chose distractor B, *the beans can change ammonia to nitrate*, failed to understand that, leguminous plants converts nitrogen gas and not the other gases. Moreover, those who chose distractors C, *the beans can change nitrogen to ammonia*, D, *the beans can change nitrate to nitrogen* and E, *the beans can change ammonia to nitrogen*, did not understand that, the material taken from air is naitrogen and the material produced is nitrate which fertilizes the soil and not otherwise.

Question 3: What is the advantage of insects?

- A To transport flowers.
- B To eat flowers.
- C To develop flowers.
- D To pollinate flowers.
- E To shed flowers.

This question measured candidates' ability to identify the importance of insects in plant development. The question was attempted by 1,004,473 (99.43%) candidates. The performance in this question was good since 856,241 (84.73%) candidates responded correctly. The rest, 148,232 (14.70%) failed to respond correctly as they chose among the distractors A, B, C and E as shown in Table 1.

Table 1: Number and Percentage of Candidates in each Option

Option	A	B	C	D*	E	Others
No. of Candidates	32,807	40,588	38,904	856,241	35,933	6,041
Percentage of Candidates	3.25	4.02	3.85	84.73	3.56	0.60

Data in Table 1 show that, most of the candidates (84.73%) chose the correct response D, *to pollinate flowers*. These candidates had enough knowledge of the role of insects in pollination.

They recognized that, insects help in the process of pollination, in which through their hairy body they trap and transfer pollen grains (male gamete) from one flower to another.

Further analysis indicates that, 14.70 per cent of the candidates who failed to answer this question correctly, lacked enough understanding of the importance of insects in pollination. For example, those who chose distractor A, *to transport flowers*, did not know that insects that move from one flower to another transport pollen grains and not flowers. Also, those who chose distractor B, *to eat flowers*, did not know that when insects land on the flower, they take nectar as a raw material for honey making but they do not eat the flower. During the act of searching for nectar by moving from one flower to another, pollination occurs. Those who opted for distractor C, *to develop flowers* and E, *to shed flowers*, were uninformed on the whole process of pollination in plants.

Question 4: What is the aim of family planning in the family?

- A To decrease the spread of diseases.
- B To leave space between one birth and another.
- C To reduce number of children.
- D To decrease the number of children sent to clinic.
- E To enable the children to get essential services.

The question intended to measure candidates' understanding of the aim of family planning in the family. The question was attempted by 1,002,446 (99.17%) candidates. The performance on this question was good since more than two third of the candidates (68.27%) responded correctly and 312,596 (30.90%) failed to respond correctly. Table 2 summarises the performance of candidates in this question.

Table 2: Number and Percentage of Candidates in each Option

Option	A	B	C	D	E*	Others
No. of Candidates	51,422	143,065	87,235	30,874	689,850	8,068
Percentage of Candidates	5.09	14.16	8.63	3.06	68.27	0.80

Statistics in Table 2 show that, most of the candidates (68.27%) were able to identify that option E, *to enable the children to get essential services* is the correct answer. These candidates understood that, the main aim of practicing family planning is to have a family that can be manageable.

However, the candidates who failed to respond correctly to this question by choosing distractors A, B, C, and D were not aware of the aim of practicing family planning. For example, those who chose distractor B, *to leave space between one birth and another*, C, *to reduce number of children* and D, *to decrease the number of children sent to clinic*, failed to differentiate between the results and the aim of family planning. Moreover, those who chose distractor A, *to decrease the spread of diseases* did not understand that, family planning does not prevent the spread of diseases rather it reduces the number of people, making it possible for a family to provide children with basic needs such as food, clothing and education.

Question 5: Why is it advised not to smoke cigarette?

- A To avoid chest and blood cancer.
- B To avoid blood and liver cancer.
- C To avoid lungs and chest cancer.
- D To avoid skin and chest cancer.
- E To avoid liver and lungs cancer.

The question measured candidates' ability to identify the impact of cigarette smoking. A total of 1,002,904.00 (99.24%) candidates attempted this question. The performance in this question was average as 575,413 (56.94%) candidates responded correctly. On the other hand, 427,491 (42.30%) candidates failed. Table 3 shows the performance statistics in this question.

Table 3: Number and Percentage of Candidates in each Option

Option	A	B	C*	D	E	Others
No. of Candidates	42,005	32,083	575,413	28,412	324,991	7,610
Percentage of Candidates	4.16	3.17	56.94	2.81	32.16	0.75

More than half of the candidates (56.95%) chose the correct response C, to *avoid lungs and chest cancer*. These candidates were aware that the smoke from ciggarettes affects the lungs and chest first and there after, the impacts may be spread to the other organs.

On the other hand, the candidates who opted for the incorrect responses A, B, D and E were not aware of the impacts of ciggarette smoking. They failed to identify that, the smoke from ciggarettes does not affect organs such as the liver and skin directly. Also, they did not understand that the smoke does not enter the blood directly as it filtred at the lungs.

Question 6: How can the society protect itself from malaria?

- A By using treated mosquito nets.
- B By swallowing anti malaria pills.
- C By making mosquito net clean.
- D By killing the plasmodium.
- E By preventing and killing bacteria.

This question measured candidates' understanding of the method that can be used to protect the society against malaria. Out of 1,004,422 (99.42%) candidates who attempted this question, 884,384 (87.52%) answered correctly implying a good performance. A few candidates, 120,038 (11.90%) failed as they chose among the distractors B, C, D and E instead of the correct response A. The candidates' performance in this question is shown in Figure 3.

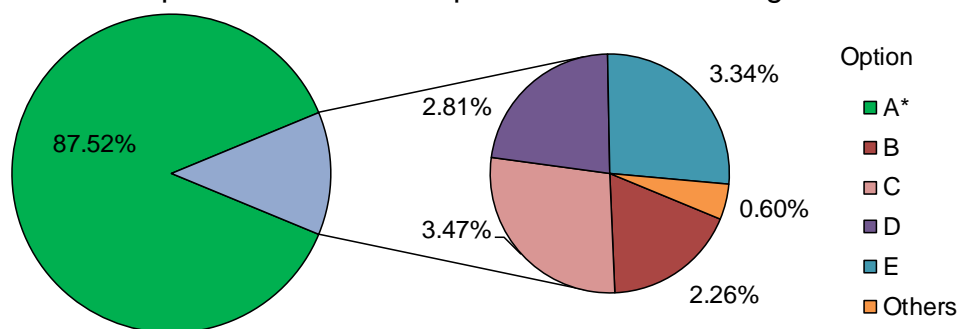


Figure 3: Candidates' Performance in Question 6

The statistics in Figure 3 show a good performance on this question since 87.52 per cent of the candidates chose the correct response. Those candidates understood that among the ways to protect against malaria is to use treated mosquito nets. They intergrated knowledge learnt in the classroom, daily experience of using treated mosquito nets and the information received from various media for communications in which it is insisted to use treated mosquito nets.

Few candidates (11.90%) failed to answer this question correctly since they chose among distractors B, C, D and E. These candidates lacked enough knowledge of ways to protect against malaria. For example, those who chose distractor B, *by swallowing anti malaria pills*, did not know that this is a way used to cure malaria and not a protection technique. Moreover, those who chose distractor C, *by making mosquito net clean*, did not know that cleaning mosquito nets can protect against diseases caused by dirt but not malaria. The candidates who chose distractor D, *by killing the plasmodium*, failed to understand that plasmodium live in human blood and are spread from one person to another through mosquito bite. Thus, it is easy to kill mosquitoes that spread malaria but not plasmodium. Those who chose distractor E, *by preventing and killing bacteria*, did not know that malaria is spread by mosquitoes and not bacteria.

Question 7: Why is it advisable to boil drinking water?

- A In order to make it clean.
- B In order to make it clear.
- C In order to make it safe.
- D In order to make it hot.
- E To make it sweet.

The question assessed candidates' understanding of the importance of boiling drinking water. A total of 1,004,824 (99.44%) candidates attempted this question. The overall performance in this question was good since 769,595 (76.16%) candidates answered correctly and 235,229 (23.28%) failed. Table 4 shows a summary of candidates' performance statistics in this question.

Table 4: Number and Percentage of Candidates in each Option

Options	A	B	C*	D	E	Others
No. of candidates	182,515	18,977	769,595	17,355	16,382	2,845
Percentage of Candidates	18.06	1.88	76.16	1.72	1.62	0.56

As observed in Table 4, most of the candidates, (76.16%) chose the correct response C, *in order to make it safe*. These candidates knew that boiling water kills disease causing germs thus, making the water safe for drinking.

On the other hand, 23.28 per cent of the candidates who chose incorrect responses A, B, D and E lacked knowledge of the importance of boiling drinking water. They failed to recognise that the aim of boiling water is to make it clean. Most of them (18.06%), opted for response A, *in order to make it clean*. These candidates did not know that boiling water does not make it clean unless boiled and filtered, similar to those who chose distractor B, *in order to make it clear*. The candidates who chose distractor D, *in order to make it hot* and E, *to make it sweet*, did not know that drinking water must be safe and clean and not otherwise.

Question 8: What is the importance of carbondioxide gas to plants?

- A Used in formation of flowers.
- B Used in pollination.
- C Used in respiration.
- D Used in formation of fruits.
- E Used in synthesis of food.

The question measured candidates' understanding of the importance of carbondioxide gas to plants. A total of 999,921 (98.95%) candidates attempted this question out of which 663,750 (65.68%) responded correctly while 336,171 (33.27%) failed. Generally, the performance of the candidates in this question is good as summarized in Table 5.

Table 5: Number and Percentage of Candidates in each Option

Options	A	B	C	D	E*	Others
No. of candidates	49,301	114,410	125,982	46,478	663,750	10,593
Percentage of Candidates	4.88	11.32	12.47	4.60	65.68	1.05

The statistics in Table 5 show that almost two third of the candidates (65.68%) chose the correct response E, *used in synthesis of food*. These candidates understood the importance of carbondioxide gas to plants. They knew that carbondioxide gas is used by plants during the photosynthesis process.

Nevertheless, one third of the candidates (33.27%) chose among the incorrect responses A, B, C and D. These candidates lacked knowledge of the importance of carbondioxide gas to plants. For example, those who chose distractors A, *used in formation of flowers* and D, *used in formation of fruits*, did not know that carbondioxide in plants is used when a plant makes its own food which is stored as starch in different parts of the plant like roots, stems and fruits. Also, those who chose distractor B, *used in pollination*, did not know that pollination is the process of transferring pollen grains from the stamen to stigma for fertilization. This process involves agents of pollination like water, wind and insects and not carbondioxide gas. Likewise, those who chose destractor C, *used in respiration*, did not know that the process of respiration in both plants and animals uses oxygen gas to burn food molecules. Carbondioxide gas is the byproduct of the process and not the raw material.

Question 9: Which characteristic of animals in amphibian group differentiates them from birds?

- A Having warm blood.
- B Short bones.
- C Laying eggs.
- D Living in water.
- E Living in land.

This question assessed candidates' ability to identify the characteristic of animals in the group of amphibian that differentiates them from birds. The general performance in this question is poor since out of 999,107 (98.87%) candidates who attempted this question, 457,683 (45.29%) chose the correct response D, *living in water*. On the other hand, 541,424 (53.58%) candidates chose among the distractors A, B, C and E. Table 6 summarises candidates' performance in this question.

Table 6: Number and Percentage of Candidates in each Option

Options	A	B	C	D*	E	Others
No. of Candidates	207,114	59,951	191,598	457,683	82,761	11,407
Percentage of Candidates	20.50	5.93	18.96	45.29	8.19	1.13

Table 6 shows that 45.29 per cent of the candidates were able to choose the correct response D, *living in water*. These candidates were aware that amphibian is a group of organisms characterized by living in water and shade areas with dew.

The statistics also show that, 53.58 per cent of the candidates failed to answer correctly, as they chose among distractors A, B, C and E. These candidates did not realize that animals in the group of amphibians live in water contrary to birds which live mostly on land. Most of them (20.50%) chose distractor A, *having warm blood*, since they did not know that amphibians have cold blood while birds have warm blood. Also, 18.96 per cent of the candidates chose option C, *laying eggs*, since they did not know that amphibians and birds both lay eggs. Those who chose option B, *short bones*, did not know that they both have short bones. Likewise, those who chose option E, *living in land*, were oblivious that birds live on land but amphibians live on moist areas.

Question 10: Which is the pair of hereditary diseases?

- A Malaria and trachoma.
- B Cancer and chicken pox.
- C Sickle cell and haemophilia.
- D Trachoma and measles.
- E Tetanus and AIDS.

The question measured candidates' understanding of hereditary diseases. A total of 1,001,082 (99.07%) candidates attempted this question out of which, 644,487 (63.78%) responded correctly and 356,595 (35.29%) failed to respond correctly. The general performance of the candidates in this question is good as shown by the statistics presented in Figure 4.

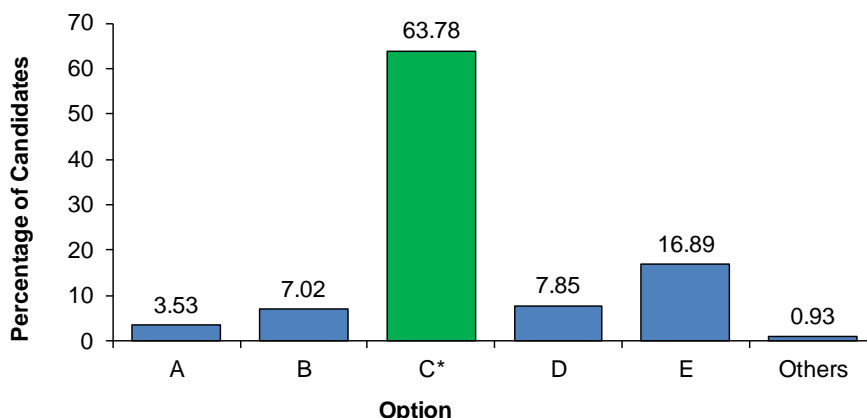


Figure 4: Candidates' Performance in Question 10

Data in Figure 4 show that 63.78 per cent of the candidates responded to this question correctly. These candidates were able to identify that option C, *sickle cell and haemophilia*, represents hereditary diseases. The ability of the candidates to identify the correct answer was due to having enough understanding about different types of diseases such as communicable, non-communicable, venereal and hereditary diseases.

However, 35.29 per cent of the candidates failed to recognise hereditary diseases thus, they chose among distractors A, B, D and E.

These candidates lacked knowledge of types of diseases which could have helped them identify hereditary diseases. Most of them (16.89%) opted for E, *tetanus and AIDS*, indicating that they did not know that these are infectious diseases. A person cannot inherit these diseases but may be infected from the parents if precautions are not taken. Likewise, those who chose distractors A, *malaria and trachoma* and D, *trachoma and measles*, did not know that those also are infectious diseases. The candidates who chose distractors B, *cancer and chicken pox*, were uninformed that cancer is a non-communicable disease, can neither be spread from one person to another nor inherited from one generation to another.

Question 11: What are the basic needs for life?

- A Water, food and air.
- B Vitamins, water and air.
- C Protein, starch and minerals.
- D Water, air and fruits.
- E Air, clothes and light.

This question measured candidates' understanding of the basic needs for life. The question was attempted by 1,003,348 (99.29%) candidates out of which 900,415 (89.10%) gave a correct response while 102,933 (10.19%) failed. Generally, this was the best performed question as compared to other questions in this examination. The number and percentage of the candidates in each option is summarized in Figure 5.

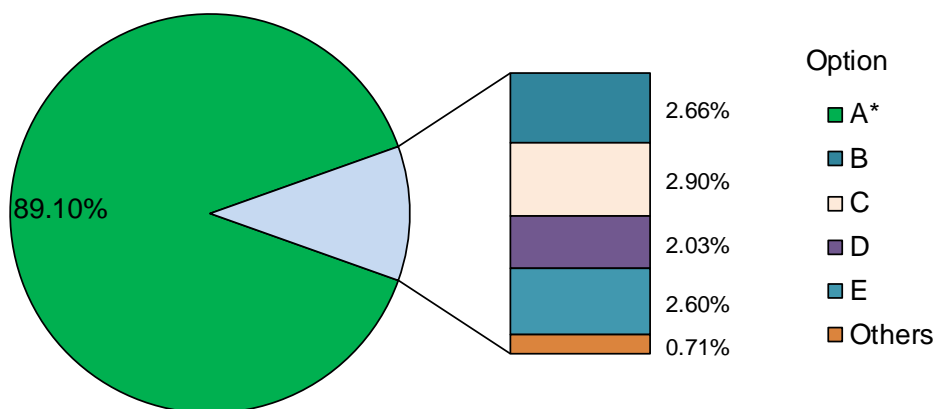


Figure 5: Candidates' Performance in Question 11

Statistics in Figure 5 show that most of the candidates (89.10%) were able to identify the correct response A, *water, food and air*. These candidates had enough knowledge of the basic needs for life. They were able to recognize that in order to live water, food and air are essential needs. They knew that, some needs like clothing and light does not support life thus, we can live without them.

On the other hand, few candidates (10.19%) failed to answer this question correctly. These candidates lacked enough knowledge of the basic needs for life. For example, those who chose distractors B, *vitamins, water and air*, C, *protein, starch and minerals* and D, *water, air and fruits*, did not know that *vitamins, protein, starch, minerals* and *fruits* are small groups which form food. Living things need food and not only one group of food. Likewise, those who chose option E, *air, clothes and light*, did not know that not every need is essential for life. One can live without *clothes* and *sunlight* provided there is food, air and water.

Question 12: Which part of female reproduction has the same function as the sperm duct in male?

- A Ovary
- B Uterus
- C Cervix
- D Fallopian tube
- E Vagina

This question assessed candidates' understanding of the function of different parts of the female and male reproductive system. The question was attempted by 1,000,143 (98.97%) candidates, out of which 566,519 (56.06%) responded to it correctly and 433,624 (42.91%) failed. The overall performance in this question was average as shown by the statistics in Table 7 shows.

Table 7: Number and Percentage of Candidates in each Option

Option	A	B	C	D*	E	Others
No. of Candidates	176,475	82,278	85,999	566,519	88,872	10,371
Percentage of Candidates	17.46	8.14	8.51	56.06	8.79	1.03

Table 7 shows that 56.06 per cent of the candidates chose the correct response D, *Fallopian tube*. These candidates understood that, the Fallopian tube carries female gametes (an egg) similar to the sperm duct which carries male gametes.

Nevertheless, 42.91 per cent of the candidates opted for distractors A, *ovary*, B, *uterus*, C, *cervix* and E, *vagina*. These candidates were not aware of different parts of the male and female reproductive system and their functions thus, they failed to recognize the correct answer. The candidates were supposed to understand that; an ovary is a female reproductive part which produces female gametes similar to testes in men which produces sperms. The uterus is a hollow organ in which a zygote is implanted. This organ is not found in male reproductive system. Also, cervix is the door which connects the vagina and the uterus, it is not present in male reproductive system. Moreover, the vagina is a female part which receives and transmits sperms from the mens penis.

Question 13: Why is milk from the mother important to the child?

- A Has got the same temperature as that of the mother.
- B Has got nutrients and natural body defense.
- C Has got the same temperature as the boiled milk.
- D Has no germs that transmit diseases.
- E It is available at any time needed.

The question assessed candidates' ability to identify the importance of mother's milk to a child. The performance in this question was good as out of 1,003,178 (99.27%) candidates who attempted the question, 794,059 (78.58%) responded correctly and 209,119 (20.69%) failed to respond correctly. The distribution of percentage of candidates in each option is as shown in Figure 6.

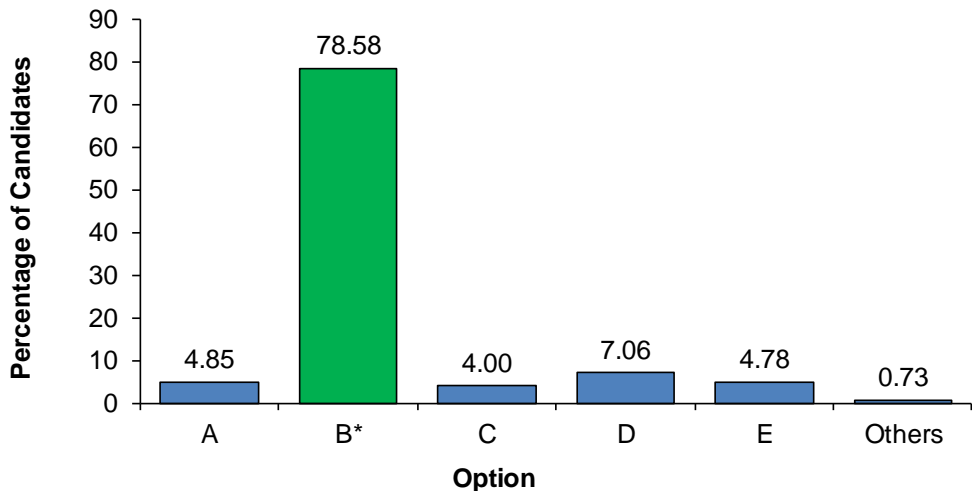


Figure 6: Candidates' Performance in Question 13

Figure 6 shows that the performance of the candidates in this question was good as 78.58 per cent of the candidates chose the correct response. These candidates had enough knowledge of the importance of mother's milk to children. They understood that, mother's milk has all the necessary nutrients for the children in proper amount. It also supplies the child with body immunity against diseases. This knowledge helped them to identify that, option B, *has got nutrients and natural body defense* is the correct answer.

On the other hand, 20.69 per cent of the candidates who opted for incorrect options A, C, D and E lacked knowledge of the importance of breast milk to children. For example, the candidates who chose incorrect response A, *has got the same temperature as that of the mother* and C, *has got the same temperature as the boiled milk*, did not know that the milk temperature from any source can be adjusted in anyhow to meet baby's required temperature. Thus, this is not the importance of breastfeeding children. Also, those who opted for distractor D, *has no germs that transmit diseases*, did not know that mothers milk may contain disease causing germs if the mother is infected with such a disease. For example, germs like HIV may be present in mother's milk thus, HIV/AIDS infected mothers are given precautions on how to breastfeed their babies. Those who opted for distractor E, *it is available at any time needed*, did not know that, all

kinds of milk may be available any time as it can be stored and used when needed.

Question 14: What is the function of the bone?

- A To protect the muscles.
- B To manufacture blood cells.
- C To manufacture salts.
- D To protect the blood system.
- E To protect the skin.

The question intended to measure candidates' knowledge of the function of bones in the body. The overall performance in this question was average as out of 1,001,778 (99.13%) of the candidates who attempted the question, 482,731 (47.77%) candidates answered it correctly. The rest, 519,047 (51.36%) failed. Table 8 shows the number and percentage of the candidates in each option.

Table 8: Number and Percentage of Candidates in each Option

Options	A	B*	C	D	E	Others
No. of Candidates	298,752	482,731	34,947	115,012	70,336	8,736
Percentage of Candidates	29.56	47.77	3.46	11.38	6.96	0.86

Table 8 shows that 47.77 per cent of the candidates chose a correct response B, *manufacture blood cells*. These candidates understood the function of the bones in the body.

Nevertheless, more than half of the candidates who answered this question (51.36%) failed to answer it correctly. These candidates lacked knowledge on the importance of bones in the body. For example, most of them (29.56%) opted for incorrect response A, *to protect the muscles* of which is not true since the muscles do attach themselves exterior to the bones thus, they cannot be protectect by the bones. Also, 11.38 per cent of the candidates opted for distractor D, *to protect the blood system* since they did not know that the blood system is made up of blood vessels and not the bones. These

responses indicate that the candidates were unaware of the function of bones in the body.

Question 15: Which are the main sources of protein?

- A Milk, meat and eggs.
- B Milk, fish and vegetables.
- C Milk, fish and fruits.
- D Milk, meat and carrots.
- E Milk, fish and maize.

This question assessed candidates' ability to identify food found in the group of protein. The question was attempted by 1,004,384 (99.39%) candidates in which 686,249 (67.91%) candidates responded correctly and 318,135 (31.48%) failed. Generally, the performance of the candidates in this question was good as summarized in Table 9.

Table 9: Number and Percentage of Candidates in each Option

Options	A*	B	C	D	E	Others
No. of Candidates	686,249	172,630	75,641	27,531	42,333	6,130
Percentage of Candidates	67.91	17.08	7.49	2.72	4.19	0.61

Table 9 portrays that 67.91 per cent of the candidates identified that option A, *milk, meat and eggs* are the sources of protein. These candidates had enough knowledge of the groups of food which helped them to identify proteinous food in the group of other food types.

On the other hand, 31.48 per cent of the candidates failed to recognize the correct response. These candidates chose among distractors B, C, D and E since they lacked enough knowledge of the types of food found in each group of food. For example, those who opted for B, *milk, fish and vegetables*, C, *milk, fish and fruits* and D, *milk, meat and carrots*, did not know that, *vegetables, fruits* and *carrots* fall under the group of vitamins and not protein. Likewise, those who opted for E, *milk, fish and maize* did not know that, *maize* falls under the group of carbohydrate.

Question 16: Which one is **not** the function of saliva in the mouth?

- A To digest protein.
- B To digest starch.
- C To moisten the food.
- D To lubricate the food.
- E To facilitate swallowing of food.

The question assessed candidates' understanding of the importance of saliva in the digestion system. The performance in this question was average as out of 1,001,840 (99.13%) candidate who attempted this question, 439,905 (43.53%) responded correctly. The rest of the candidates, 561,935 (55.60%) failed. Table 10 gives a summary of performance of the candidates in this question.

Table 10: Number and Percentage of Candidates in each Option

Options	A*	B	C	D	E	Others
No. of Candidates	439,905	159,843	167,917	89,805	144,370	8,674
Percentage of Candidates	43.53	15.82	16.62	8.89	14.29	0.86

The statistics in Table 10 show that the performance of the candidates in this question was average since 43.53 per cent of the candidates were able to choose the correct answer. These candidates were able to identify that options B, *to digest starch*, C, *to moisten the food*, D, *to lubricate the food* and E, *to facilitate swallowing of food*, are the functions of saliva in the digestive system. They were able to identify that option A, *to digest protein*, is the correct answer since it is not a function of saliva in the mouth. This implies that these candidates were knowledgeable about the digestive system particularly the function of saliva.

However, 55.60 per cent of the candidates who failed to realize the correct answer lacked enough knowledge about the digestive system specifically the function of saliva. These candidates chose among distractors B, C, D and E which were the functions of saliva in the mouth. They failed to recognize that, of all the responses A, *to digest protein*, is not the function of saliva as the digestion of protein

starts in the stomach and not in the mouth. Moreover, these candidates misunderstood the demand of the question since, instead of choosing the answer which is **not** the function of saliva, they were choosing the functions of the saliva in the mouth.

Question 17: What is the source of diabetes?

- A Deficiency of thyroid hormone.
- B Deficiency of adrenalin hormone.
- C Defect in thyroid gland.
- D Defect in pituitary gland.
- E Defect in the pancreas.

The question assessed candidates' ability to identify the cause of diabetes disease. A total of 999,067 (98.87%) candidates attempted this question, out of which 560,134 (55.43%) responded correctly. The rest, 438,933 (43.44%) candidates failed to respond correctly. Generally, this question had an average performance. Table 11 shows a summary of the performance of the candidates.

Table 11: Number and Percentage of Candidates in each Option

Options	A	B	C	D	E*	Others
No. of Candidates	109,881	146,358	100,419	82,275	560,134	11,447
Percentage of Candidates	10.87	14.48	9.94	8.14	55.43	1.13

Table 11 shows that, 55.43 per cent of the candidates managed to recognize that option E, *defect in the pancreas*, is the correct answer. These candidates were aware that the pancreatic gland produces insulin hormone which controls the amount of sugar in the body. Thus, any defect in the pancreatic gland will lead to diabetes.

On the other hand, those candidates (43.44%) who failed to respond correctly to this question lacked enough knowledge of function of different glands and hormones in the body. They failed to realize that, the defect in the pancrease gland causes diabetes. Out of them, 14.48 per cent opted for incorrect response B, *deficiency of adrenalin hormone*. These candidates did not know that the defficiency in adrenaline make the person to be weak and may fail to

respond to strange external stimuli but not diabetes. Also, 20.81 per cent who opted for A, *deficiency of thyroid hormone* and C, *defect in thyroid gland* did not know that thyroid gland controls metabolism and not blood sugar. Likewise, those who opted for D, *defect in pituitary gland* were not aware that pituitary gland is the master gland which controls all activities of the body such as growth and protection thus, it is not directly involved in controlling blood sugar.

Question 18: Which is the function of cell wall in a plant cell?

- A To differentiate parts of the plant cell.
- B To make the plant cell soft.
- C To make the shape of the plant cell.
- D To prevent water loss from the plant.
- E To make the plant to manufacture food.

The question assessed candidates' ability to identify the function of different parts of a plant cell specifically the cell wall. The question was attempted by 994,302 (98.39%) candidates, out of which 413,228 (40.89%) responded correctly and 581,074 (57.50%) failed. The general performance of the candidates in this question was average as shown in Table 12.

Table 12: Number and Percentage of Candidates in each Option

Options	A	B	C*	D	E	Others
No. of Candidates	148,281	89,826	413,228	169,678	173,289	16,212
Percentage of Candidates	14.67	8.89	40.89	16.79	17.15	1.60

The statistics in Table 12 shows that, 40.89 per cent of the candidates were able to respond correctly to this question. These candidates had enough knowledge of the function of different parts of the plant cell. They knew that, the cell wall provides the specific shape to the plant cell as it is tough and rigid. This understanding helped them to recognize that option C, *to make the shape of the plant cell* is the function of the cell wall.

Nevertheless, 57.50 per cent of the candidates failed to choose the correct response. These candidates did not understand the functions of different parts of the plant cell.

For example, 33.94 per cent of the candidates chose distractors D, *to prevent water loss from the plant* and E, *to make the plant to manufacture food*. These candidates did not know that preventing water loss and manufacturing food are the functions of stomata and chlorophyll respectively and not cell wall. Also, those who chose A, *to differentiate parts of the plant cell*, did not know that, the cell wall is the outer part of the plant cell thus, it cannot be used to differentiate the other parts of a plant cell. Likewise, those who chose distractor B, *to make the plant cell soft*, did not know the structure of the cell wall as it is tough and rigid.

Question 19: In which group of animals does a bat belong?

- A Mammals
- B Reptiles
- C Birds
- D Owl
- E Amphibians

The question assessed candidates' understanding of different groups of animals specifically the group to which the bat belongs. The question was attempted by 1,003,343 (99.29%) candidates out of which 805,272 (79.69%) responded correctly. A few candidates, 198,071 (19.60%) failed. Generally, the candidates' performance in this question was good as seen in Figure 7.

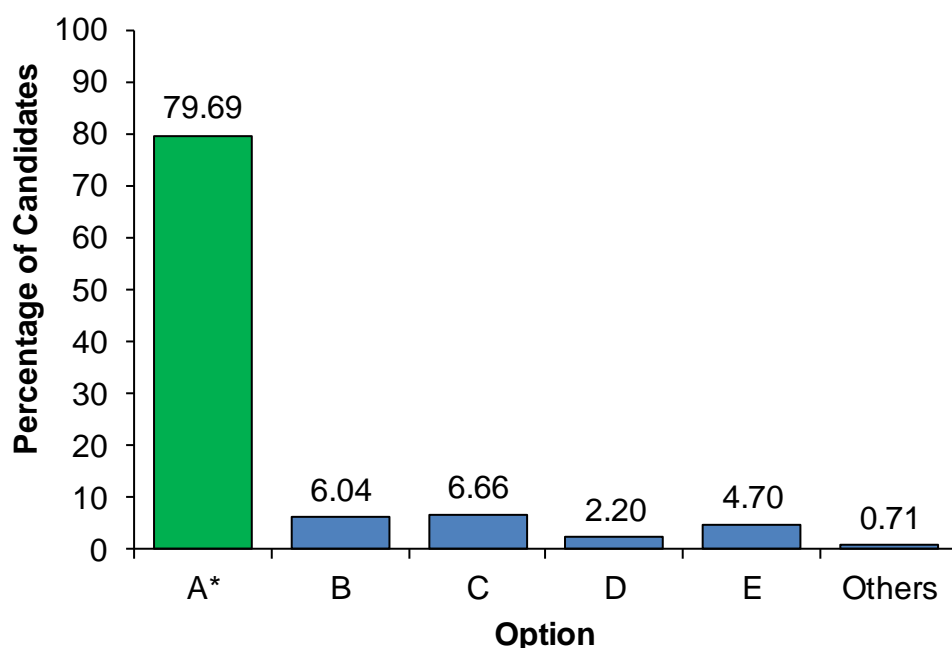


Figure 7: Candidates' Performance in Question 19

Data in Figure 7 show that, a large percent of the candidates (79.69%) chose the correct response A, *mammals*. These candidates knew different groups of animals thus, they were able to identify that a bat belongs to mammals group. Moreover, they understood the characteristics of the bat that it gives birth and breastfeeds the young one just like the rest of the mammals.

Nevertheless, a few candidates (19.60%) who failed to respond correctly to this question had inadequate knowledge of characteristics of different groups of animals. For example, those who chose distractor B, *reptiles* did not know that this group involves animals who lay eggs and their skin is covered with scales like snakes and lizards. Those who opted for distractor C, *birds*, did not know that all birds lay eggs but bats do give birth to the young ones. The candidates' interest on distractor C, *birds*, was contributed by the behaviour of the bat to fly thus, the candidates were interested to place it in the birds group of which is wrong. Distractors D, *owl* and E, *amphibian*, attracted candidates who did not know that an owl is an animal and not a group of animals. Amphibia is a group of animals with moist skin and they lay eggs of which is not a characteristic of birds.

Question 20: Which advice is **not** useful to an AIDS victim?

- A To use medicine as instructed by the doctor.
- B To have lovers who have no AIDS.
- C To accept the situation and educate others.
- D To live with hope and take care of oneself.
- E To eat balanced diet and attend medical checkup frequently.

The question measured candidates' understanding of the useful advices to be given to an AIDS victim. The question was attempted by 1,003,550 (99.31%) candidates, out of which 777,781 (76.97%) responded correctly. However, 225,769 (22.34%) candidates failed to respond correctly thus they chose among the distractors A, C, D, and E, as summarised in Table 13.

Table 13: Number and Percentage of Candidates in each Option

Options	A	B*	C	D	E	Others
No. of Candidates	41,211	777,781	79,232	52,332	52,994	7,203
Percentage of Candidates	4.08	76.97	7.84	5.18	5.24	0.69

The statistics in Table 13 show that, most of the candidates (76.97%) chose the correct response B, *to have lovers who have no AIDS*. These candidates were aware that, this is not a useful advice to the AIDS victim as doing so will increase the spread of HIV/AIDS.

Nevertheless, a few candidates (22.34%) failed to respond to this question correctly. These candidates chose among distractors A, *to use medicine as instructed by the doctor*, C, *to accept the situation and educate others*, D, *to live with hope and take care of oneself* and E, *to eat balanced diet and attend medical checkup frequently*, they indicating that, they did not know other piece of advice which should not be given to the AIDS victims. The advice given in all the distractors is good to be given to the AIDS victims.

Question 21: Which method should be used to reduce HIV transmission?

- A Reserve special areas for people living with HIV.
- B Avoid sharing food with people living with HIV.
- C Eat balanced diet and drink safe water.
- D Change behaviors and avoid unsafe sex.
- E Perform physical exercises.

The question assessed candidates' understanding about the methods of reducing HIV transmission. The general performance in this question was good as out of 1,003,311 (99.30%) candidates who attempted the question, 803,672 (79.50%) responded correctly. On the other hand, 199,639 (19.80%) failed to respond correctly by choosing the distractors A, B, C and E as summarised in Table 14.

Table 14: Number and Percentage of Candidates in each Option

Options	A	B	C	D*	E	Others
No. of Candidates	41,384	47,175	71,835	803,672	39,245	7,203
Percentage of Candidates	4.10	4.67	7.11	79.53	3.88	0.71

Statistics in Table 14 show that most of the candidates responded correctly to this question. These candidates had enough knowledge about methods of reducing HIV transmission. Therefore, they managed to recognise that option E, *change behaviors and avoid unsafe sex* is the correct response.

On the other hand, a few candidates (19.80%) who failed to respond correctly to the question had inadequate knowledge about the method of reducing HIV transmission. For example, those who chose incorrect option A, *reserve special areas for people living with HIV* and B, *avoid sharing food with people living with HIV* did not know that, those actions symbolise stigmatisation which is discouraged in the society. Those who chose C, *eat balanced diet and drink safe water* and E, *perform physical exercises*, failed to understand that, those activities enable the human body to be strong and healthy but it does not reduce HIV transmission.

Question 22: The following things can transmit heat except

- A Wire
- B Air
- C Plastic
- D Nail
- E Water

This question assessed the candidates' understanding about things which transmit heat. Performance in this question was average since out of 1,002,220 (99.20%) candidates who attempted this question, 469,522 (46.46%) responded to it correctly. However, 532,698 (52.70%) candidates failed to respond correctly by choosing among the distractors A, B, D and E. The summary of percentage of candidates in each option is presented in Table 15.

Table 15: Number and Percentage of Candidates in each Option

Options	A	B	C*	D	E	Others
No. of Candidates	69,657	213,005	469,522	114,882	135,154	8,294
Percentage of Candidates	6.89	21.08	46.46	11.37	13.37	0.82

The data in Table 15 show that this question had an average performance since 46.46 per cent of the candidates chose the correct response C, *plastic*. These candidates had adequate knowledge about characteristics of different materials. They recognised that plastic material does not have free electrons which enable heat to move from one point to another.

Nevertheless, 40.33 per cent of the candidates who opted for distractors A, *wire*, B, *air*, D, *nail* and E, *water* failed to understand that wire and nail transmit heat by conduction while water transfers heat by means of convection. They also failed to realise that, air transfers heat by radiation. Not only that, they also failed to recognise that wire, air, nail and water have free electrons which are involved in the process of heat transfer from one point to another.

Question 23: What is the position of fulcrum in the first class lever?

- A Behind the effort.
- B Besides the load.
- C In front of the effort.
- D The same as the wheel.
- E Between the load and the effort.

The question assessed the candidates' understanding about the characteristics in first class lever. The question was attempted by 998,830 (98.80%) candidates, out of which 673,791 (66.68%) responded to it correctly while 325,039 (32.20%) failed. This signifies good performance in this question. The summary of candidates' performance in this question is presented in Table 16

Table 16: Number and Percentage of Candidates in each Option

Options	A	B	C	D	E*	Others
No. of Candidates	90,719	81,789	115,573	36,958	673,791	11,684
Percentage of Candidates	8.98	8.09	11.44	3.66	66.68	1.16

Data in Table 16 shows that a large number (673,791) of the candidates responded well to this question by choosing letter E, *between the load and the effort*. These candidates were able to identify the position of fulcrum in the first class lever. They also understood the characteristics of each class, the knowledge which helped them to identify correctly the arrangement of fulcrum-load-effort in the lever.

However, 325,039 (32.17%) candidates opted for distractors A, *behind the effort*, B, *besides the load*, C, *in front of the effort* and D, *between the load and the effort*. These candidates failed to differentiate the three classes of lever hence, failed to identify the position of fulcrum in the first class lever. Furthermore, they failed to understand that, the three classes of lever are categorised based on the arrangement of the load, fulcrum and the effort.

Question 24: Why is machine important in daily life?

- A Used to increase energy.
- B Used to simplify work.
- C Used to carry loads.
- D Used to strengthen muscles.
- E Used to reduce body pain.

The question measured candidates' understanding about the importance of machines in daily life. The overall performance of the candidates in this question was good as out of 1,006,628 (99.62%) candidates who attempted this question, 893,072 (88.38%) opted for the correct response. On the other hand, 113,556 (11.24%) of the candidates chose incorrect options. The candidates' performance in this question is summarized in Figure 8.

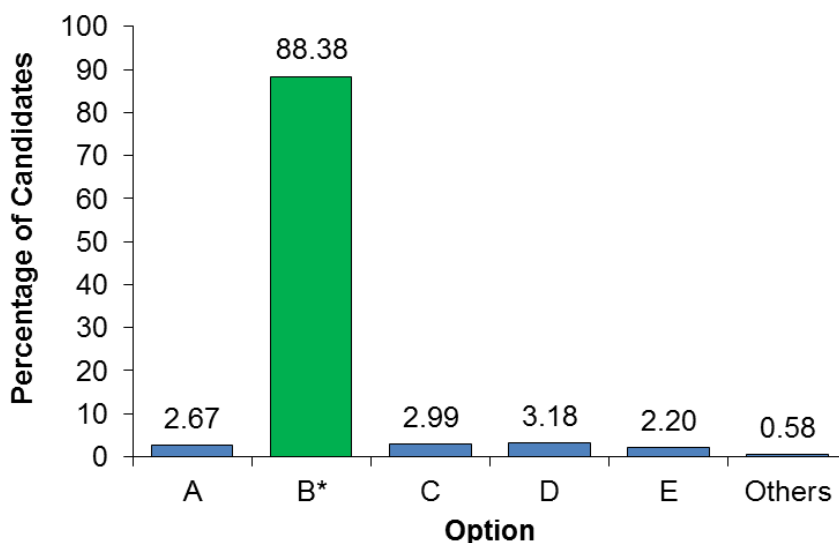


Figure 8: Candidates' Performance in Question 24

Figure 8 shows that 893,072 (88.38%) candidates managed to choose the correct response B, *used to simplify work*. Those candidates had adequate knowledge about the importance of machines in daily life.

On the contrary, 113,556 (11.22%) of the candidates who opted for incorrect responses A, *used to increase energy* C, *used to carry loads* D, *used to strengthen muscles* and E, *used to reduce body pain* failed to understand the importance of machines in daily life. They failed to recognize that the main purpose of any machine is to simplify work. For example, those who chose distractor C, *used to carry loads* did not know that, carrying loads using machine is a means of simplifying work. Furthermore, those who chose distractors A, *used to increase energy*, D, *used to strengthen muscles* and E, *used to reduce body pain*, had least understanding about the concept of machine.

Question 25: Which one of the following is a simple machine?

- A Lever
- B Winch
- C Bicycle
- D Motor car
- E Motor cycle.

The question assessed candidates' understanding about the concept of machine. Out of 1,000,287 (98.99%) candidates who attempted the question, 519,576 (51.42%) responded to it correctly and 480,711 (47.57%) failed. Generally, the performance of the candidates in this question was average as summarized in Table 17.

Table 17: Number and Percentage of Candidates in each Option

Options	A*	B	C	D	E	Others
No. of Candidates	519,576	135,249	191,844	98,487	55,131	10,227
Percentage of Candidates	51.42	13.38	18.98	9.75	5.46	1.01

Statistics in Table 17 show an average performance in this question since 51.42 per cent of the candidates chose the correct response A, *lever*. These candidates were aware that levers are among of the simple machines.

The candidates who opted for incorrect responses failed to distinguish the types of machines; this led to the failure to recognise that distractors B, *winch*, C, *bicycle*, D, *motor car* and E, *motor cycle* represents complex machines and not simple machines.

Question 26: How can you differentiate magnet from other types of matter?

- A Magnet has more power compared to other forms of matter.
- B Magnet has an ability to attract iron materials.
- C Magnet is made up of steel iron.
- D Magnet is heavier than other forms of matter.
- E Magnet is dark in colour.

The question intended to measure candidates' understanding about the concept of magnet. A total of 1,002,702 (99.23%) candidates attempted this question out of which 742,015 (73.43%) responded correctly and 260,687 (25.80%) did not. Generally, the performance of the candidates in this question was good as shown in Table 18.

Table 18: Number and Percentage of Candidates in each Option

Options	A	B*	C	D	E	Others
No. of Candidates	121,085	742,015	51,421	55,576	32,605	7,812
Percentage of Candidates	11.98	73.43	5.09	5.50	3.23	0.77

Table 18 shows that, 73.43 per cent of the candidates chose the correct answer B, *magnet has an ability to attract iron materials*. These candidates had enough understanding about the concept of magnet. They knew that magnet attracts iron and other magnetic materials by using magnetic force.

On the other hand, the candidates who opted for incorrect responses A, *magnet has more power compared to other forms of matter* C, *magnet is made up of steel iron* D *Magnet is heavier than other forms of matter* and E, *magnet is dark in colour* had inadequate knowledge on the concept of magnet. They failed to associate the properties of magnet with other types of matter hence, choosing wrong answers.

Question 27: If a machine carries a load of 60 newtons using the effort of 75 newtons, what is the mechanical advantage?

- A 450
- B 4500
- C 8
- D 0.8
- E 1.25

This question assessed the candidates' ability to calculate mechanical advantage of a machine. A total of 998,138 (98.78%) candidates attempted this question of which 324,904 (32.15%) responded correctly and 673,234 (66.62%) failed. Generally, the performance of the candidates in this question was poor as it is shown in Table 19.

Table 19: Number and Percentage of Candidates in each Option

Options	A	B	C	D*	E	Others
No. of Candidates	81,998	296,975	83,812	324,904	210,449	12,375
Percentage of Candidates	8.11	29.39	8.29	32.15	20.83	1.22

The statistics in Table 19 show that 66.62 per cent of the candidates failed to respond correctly to this question. They failed to use the formula which shows the relationship between the load and the effort used to carry the load. They did not know that mechanical advantage is calculated by using the formula, $\frac{\text{load}}{\text{effort}}$. Furthermore,

other candidates misconceived the formula of mechanical advantage with other formula of machine. For example, those who opted for distractor B, 4,500, used a wrong formula of mechanical advantage as load x effort, hence, arrived at an incorrect answer. Others interchanged the position of the effort and the load in the formula by writing $\frac{\text{effort}}{\text{load}}$, hence opted for E, 1.25.

On the other hand, a few candidates 324,904 (32.15%) managed to select the correct answer D, 0.8. These candidates had sufficient knowledge on the calculations involving mechanical advantages. Thus, they were able to use the correct formula, mechanical advantage = $\frac{\text{load}}{\text{effort}}$.

Question 28: Which instrument is used to measure electric current?

- A Resistor
- B Switch
- C Ammeter
- D Voltmeter
- E Tester

The question assessed the candidates' understanding about the use of instrument used to measure electric current. A total of 1,002,703 (99.23%) candidates attempted this question. The overall performance was average as 56.77 per cent of the candidates responded to the question correctly. However, 42.45 per cent of the candidates failed. Table 20 shows the performance statistics in this question.

Table 20: Number and Percentage of Candidates in each Option

Options	A	B	C*	D	E	Others
No. of Candidates	76,710	52,370	573,707	261,212	38,704	78,11
Percentage of Candidates	7.59	5.18	56.77	25.85	3.83	0.77

Statistics in Table 20 show that 573,707 (56.77%) of the candidates responded correctly to the question. These candidates had enough understanding about an instrument used to measure electric current. They knew that ammeter is used to measure electric current. Hence, they were able to identify that option C, *ammeter* was the correct response.

A total of 428,996 (42.45%) candidates failed to respond correctly to this question since they had inadequate knowledge about the instrument used to measure electric current. For example, those who opted for distractor A, *resistor*, failed to understand that, it is a device which provides resistance to the flow of electric current. Some chose distractor B, *switch*, a device which allows or stops electric current to pass. In other case, there were some candidates who opted for D, *voltmeter*. These candidates failed to realise that voltmeter is an instrument used to measure voltage or potential difference and not electric current. This is an indication of lack of knowledge in the concept of electricity.

- Question 29:** When Hafizi dipped a piece of iron into the tin full of water, about 100 cm^3 of water spilled out. Which statement is correct about this scientific action?
- A Amount of water spilled out is the same as the one remained in the tin.
 - B The volume of the iron is the same as the volume of water spilled out.
 - C Water spilled out is heavier than the iron.
 - D The iron is heavier than the water which spilled out.
 - E Water spilled out and iron has the same mass.

The question assessed the candidates' understanding about Archimedes Principle. The performance of the candidates in this question was average as out of 999,976 (98.96%) candidates who attempted this question, 487,683 (48.26%) responded to it correctly and 512,293 (50.70%) failed to answer correctly. Table 21 summarizes the performance of the candidates in that question.

Table 21: Number and Percentage of Candidates in each Option

Options	A	B*	C	D	E	Others
No. of Candidates	134,706	487,683	61,647	227,811	88,129	10,538
Percentage of Candidates	13.33	48.26	6.10	22.54	8.72	1.04

Table 21 shows that, 48.26 per cent of the candidates chose the correct answer B, *the volume of the iron is the same as the volume of water spilled out*. These candidates understood that when a piece of iron is dipped into the tin full of water, it displaces some amount of water which is equal to the space (volume) occupied by the piece of iron. This proves that, the piece of iron has weight and occupies space.

On the other hand, 512,293 (50.70%) candidates opted for incorrect responses A, *amount of water spilled out is the same as the one remained in the tin*; C, *water spilled out is heavier than the iron*; D, *the iron is heavier than the water which spilled out* and E, *water spilled out and iron have the same mass*. These candidates failed to give a correct response because they had inadequate knowledge about Archimedes Principle which state that, “*upthrust exerted on a body when fully or partially immersed in a fluid, is equal to the weight of the fluid displaced by that body*”. The principle explains that the volume of displaced fluid is equivalent to the volume of an object fully immersed in a fluid or to that portion or fraction of the volume immersed since the density of the fluid is constant.

Question 30: How should a nose bleeding person be attended?

- A By laying him on the ground facing downwards.
- B By placing a piece of cloth behind his head.
- C By placing a piece of warm water wetted cloth on his face.
- D By putting a piece of cotton in his ear.
- E By squeezing his nose for few minutes.

The question assessed the candidates' understanding about First Aid particularly to a person suffering from nose bleeding. The question was attempted by 998,401 (98.80%) candidates, out of which 152,897 (15.13%) responded to it correctly, while 845,504 (83.67%) failed. This signified poor performance in this question. The summary of the candidates' performance in this question is presented in Figure 9.

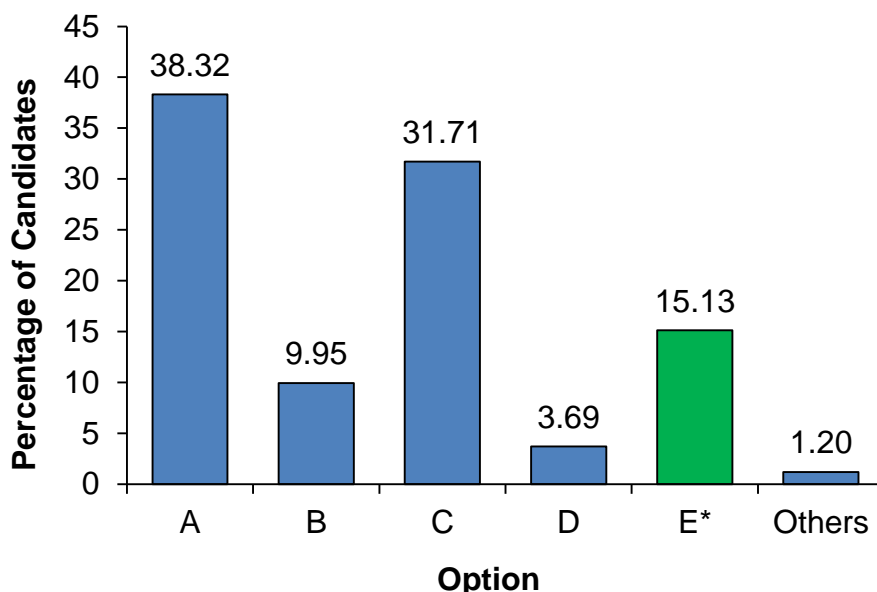


Figure 9: Candidates' Performance in Question 24

Figure 9 shows that 83.67 per cent of the candidates failed to respond correctly to this question. This made the question to be the most poorly performed as compared to others.

The candidates who failed to answer this question chose distractors A, *by laying him on the ground facing downwards*; B, *by placing a piece of cloth behind his head*; C, *by placing a piece of warm water wetted cloth on his face* and D, *by putting a piece of cotton in his ear*. These candidates did not have enough knowledge about First Aid given to a person suffering from nose bleeding. For example, those who chose distractor A, *by laying him on the ground facing downwards*, failed to understand that by doing so, bleeding will continue and the condition of the victim will be critical.

However, the candidates who chose distractor B, *by placing a piece of cloth behind his head*, failed to recognize that, to put a cloth behind his head does not help to stop nose bleeding but a wet and cold cloth to the forehead. Other candidates who chose distractor C, *by placing a piece of warm water wetted cloth on his face*, failed to realise that, warm water accelerates bleeding because warmth causes expansion of blood vessel hence allowing a lot of blood to flow in the affected area. Besides that, other candidates chose distractor D, *by putting a piece of cotton in his ear*. This also was not correct because a piece of cotton does not stop nose bleeding. On the other hand, 845,504 (15.13%) candidates who answered the question correctly by choosing E, *by squeezing his nose for few minutes* had enough understanding about the First Aid provided if a person bleeding from the nose. They understood that, the act of squeezing nose reduces blood circulation in the affected area which helps to stop bleeding.

- Question 31:** What should be done to help a vomiting pupil?
- A To give her water mixed with salt and sugar.
 - B To lay her and call a nurse for treatment.
 - C To rest her under the shade.
 - D To give her soft food.
 - E To call her parents.

The question measured the candidates' ability regarding the provision of First Aid to a pupil suffering from vomiting. The performance was good since 820,722 (81.22%) candidates responded correctly to the question. However, 182,722 (18.08%) candidates did not choose the correct response. The candidates' performance in the question is shown in Figure 10.

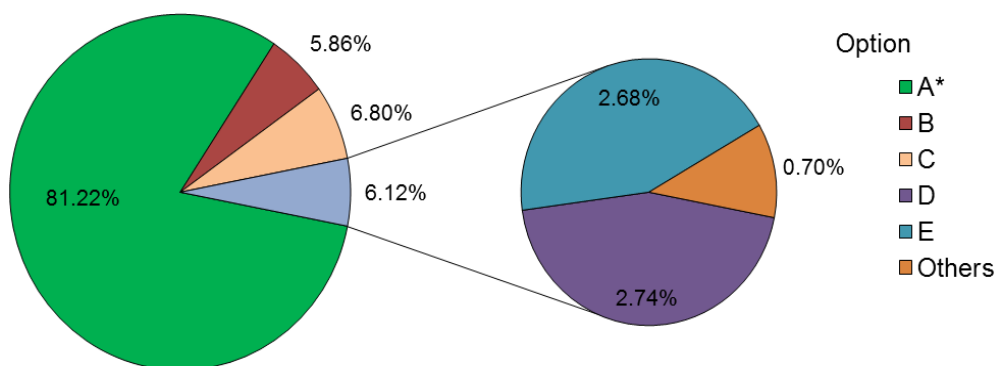


Figure 10: Candidates' Performance in Question 31

Figure 10 shows that, most of the candidates (81.22%) were able to choose the correct response A, *to give her water mixed with salt and sugar*. These candidates understood that, water containing dissolved salt and sugar helps to replace the fluids lost due to vomiting.

On the other hand, the candidates who failed to respond correctly to this question opted for, B, *to lay her and call a nurse for treatment*, C, *to rest her under the shade*, D, *to give her soft food*, and E, *to call her parents*, did not have clear knowledge about ways of helping a person vomiting. These candidates did not understand that, to do so does not stop vomiting at that time. A person is given First Aid in order to reduce the extent of the effect before going to the hospital.

Question 32: Which one is the last step when conducting a scientific experiment?

- A To set the aim.
- B To write conclusion.
- C To specify procedure.
- D To prepare tools.
- E To give out results.

The question assessed the candidates' understanding about steps involved in scientific investigation. The overall performance in this question was average as 579,512 (57.35%) candidates chose the correct response. The rest, 421,621 (41.72%) failed to answer

correctly. The performance in this question is summarised in Figure 11.

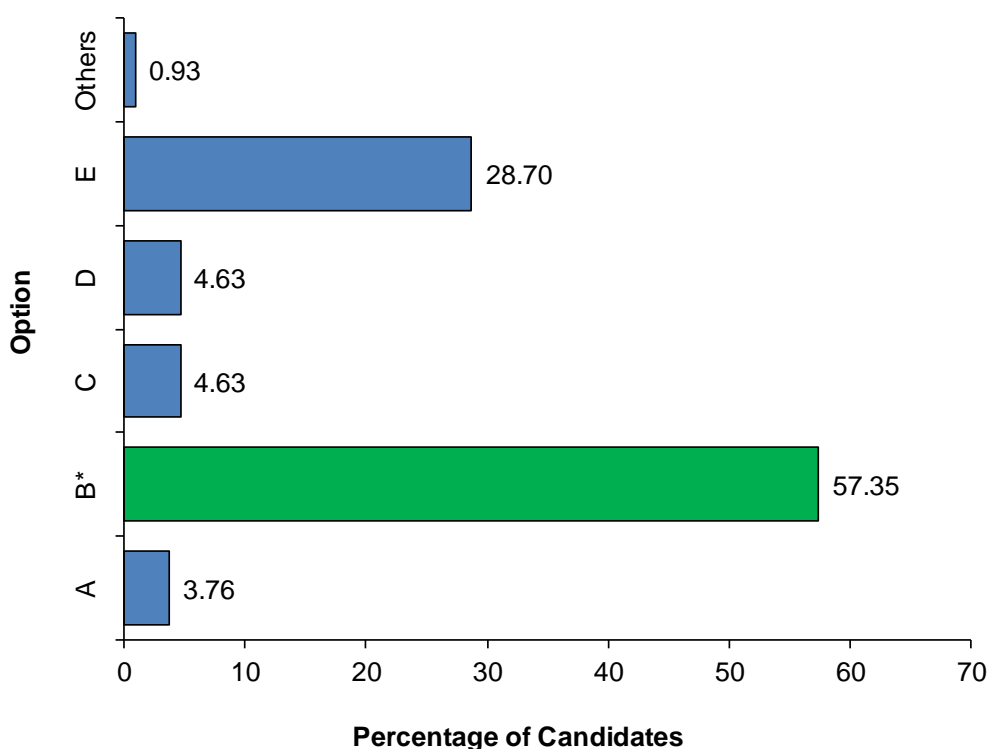


Figure 11: Candidates' Performance in Question 32

The data presented in Figure 11 show that 57.35 per cent of the candidates managed to choose the correct response B, *to write conclusion*. These candidates had enough understanding about the procedures for conducting a scientific experiment. They knew that scientific experiment starts with to set the aim, to prepare tools, to specify procedure, to give out results and to write conclusion.

On the other hand, 41.72 per cent of the candidates failed to respond correctly to the question as they chose among the distractors A, *to set the aim*, C, *to specify procedure*, D, *to prepare tools* and E, *to give out results*. These candidates did not know the correct series of the procedures of scientific experiment. For example, the candidates who chose the distractor D, did not know that, tools are prepared before conducting a scientific experiment. They failed to realise that, in doing any scientific experiment one must end up with conclusion and not to prepare tools or procedure.

Question 33: What scientific approach is used to get the correct answer on the experiment?

- A To prepare questionnaires.
- B To collect information.
- C To do investigation.
- D To answer questions.
- E To do discussion.

This question assessed the candidates' ability to identify the scientific approach used to get the correct answer on the experiment. A total of 606,878 (60.06%) candidates responded correctly to the question while 394,560 (39.05%) answered incorrectly. Generally, the performance of the candidates in this question was good as shown by statistics in Table 22.

Table 22: Number and Percentage of Candidates in each Option

Options	A	B	C*	D	E	Others
No. of Candidates	62,847	215,481	606,878	50,596	65,636	9,076
Percentage of Candidates	6.22	21.32	60.06	5.01	6.50	0.90

The statistics in Table 22 show that 60.06 per cent of the candidates managed to choose the correct response C, *to do investigation*. Those candidates knew that, scientific experiment is conducted by investigation and curiosity in order to get the correct answer.

On the other hand, 39.05 per cent of the candidates failed to respond correctly to this question. These candidates did not have enough knowledge about the procedure which is used to obtain the correct solution in science. For example, the candidates who chose A, *to prepare questionnaires*, failed to understand that, this is an instrument which is used to collect data or information. Once the data have been obtained, they are investigated deeply in order to reach the correct answer. Similarly, the candidates who chose among distractors, B, *to collect information*, D, *to answer questions* and E, *to do discussion* failed to understand that, all these are the parts of the collection of data which are required to be investigated deeply.

Question 34: The prediction about the source of the problem expected to be investigated is known as

- A experiment
- B data
- C results
- D hypothesis
- E conclusion

The question assessed the candidates' understanding about the concept of building hypothesis in scientific investigation. The performance of the candidates in this question was average since 582,668 (57.66%) candidates chose the correct response while 418,686 (41.43%) answered incorrectly. Table 23 shows the summary of the candidates' performance in this question.

Table 23: Number and Percentage of Candidates in each Option

Options	A	B	C	D*	E	Others
No. of Candidates	218,433	98,839	64,261	582,668	37,153	9,160
Percentage of Candidates	21.62	9.78	6.36	57.66	3.68	0.91

The statistics in Table 23 show that, 57.66 per cent of the candidates (59.62%) chose the correct response, D, *hypothesis*. Those candidates understood that hypothesis is an intelligent guess about the cause of the problem under investigation.

However, 41.43 per cent of the candidates chose the incorrect response to this question. Out of them, 21.62 per cent chose distractor A, *experiment*. These candidates failed to understand that, an experiment is a process carried out under controlled conditions in order to discover the unknown. Other candidates chose distractor B, *data*, which is the factual information used as a basis for reasoning or conclusion. Those who chose distractor C, *results*, failed to understand that, results are informations obtained after carrying out an experiment which helps to produce conclusion of the experiment.

Other candidates chose distractor E, *conclusion*, which is the last step in scientific investigation which proves the hypothesis.

Question 35: Observe Figure No.1 and then answer the question that follows:

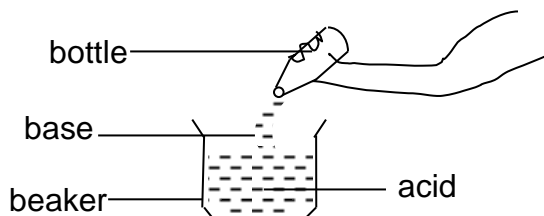


Figure No. 1

What chemical will be in the beaker after all the acid has combined with base?

- A Water and acid.
- B Soda ash.
- C Salt and base.
- D Sugar and water.
- E Salt and water

The question assessed the candidates' understanding about the product of the reaction between acid and base. The performance in this question was average since 475,016 (47.01%) candidates managed to respond correctly to the question. A total of 524,878 (51.94%) candidates failed to select the correct answer. The candidates' performance in this question is shown in Figure 12.

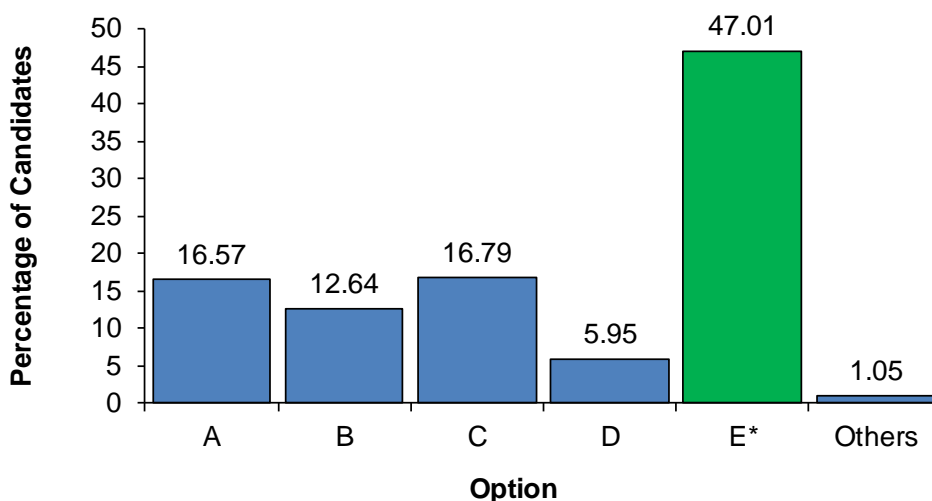


Figure 12: Candidates' Performance in Question 35

The statistics in Figure 12 show that, 47.01 per cent of the candidates who chose the correct response E, *salt and water* had enough knowledge about the product of the chemical reaction between an acid and a base.

However, almost half, 524,878 (51.94%) of the candidate failed to identify the correct answer. For example, most of them (16.57%) chose distractor A, *water and acid*. These candidates failed to understand that, once the entire acid combines with the base, there will be no more acid left so the answer cannot be water and acid. The candidates who chose distractors B, *soda ash*, C, *salt and base*, and D, *sugar and water*, did not understand the product of the reaction between acid and base, which is salt and water and not otherwise.

Question 36: Which property is about chemical change?

- A The colour of the new substance is the same as that of elements.
- B The new substance cannot return to its original form.
- C The new substance can combine with water to form acid.
- D No new substance can be formed.
- E The new substance can combine with acid to form salt.

The question assessed the candidates' understanding about the property of a chemical change which happens to a matter. A total of 568,927 (56.30%) candidates were able to choose the correct response B, *the new substance cannot return to its original form*, while 431,530 (42.70%) candidates failed to answer correctly. The candidates' performance in this question was average. Table 24 shows the candidates' performance in this question.

Table 24: Number and Percentage of Candidates in each Option

Options	A	B*	C	D	E	Others
No. of Candidates	87,013	568,927	134,911	92,290	117,316	10,057
Percentage of Candidates	8.61	56.30	13.35	9.13	11.61	1.00

Table 24 shows that more than half of the candidates (56.30%) chose the correct response B, *the new substance cannot return to its original form*. These candidates were competent specifically in properties of chemical change.

On the other hand, 42.70 per cent of the candidates chose among the distractors A, *the colour of the new substance is the same as that of elements*; C, *the new substance can combines with water to form acid*; D, *no new substance can be formed* and E, *the new substance can combine with acid to form salt*. These candidates failed to differentiate between the properties of a physical change and chemical change. Hence they failed to identify the required property of chemical change. For example, the candidates who chose distractor D, *no new substance can be formed* failed to understand that, this is among the properties of physical change. Similarly, the candidates who chose distractors A, failed to understand that, in chemical change, new substance is different from the former. Also, the candidates who chose distractors C and E failed to understand that, in order to combine with water or acid to produce a new substance, it depends on the characteristics of the new substance obtained.

Question 37: Why 'smoke' comes out when you breathe in cold weather?

- A The outside air temperature is wet.
- B The outside air temperature is low.
- C Cold air has no moisture.
- D The outside temperature is below 0°C.
- E The air temperature inside is wet.

The question assessed the candidates' understanding about events caused by temperature difference during breathing. A total of 256,912 (25.42%) candidates responded correctly to the question. Generally, the performance of the candidates in this question was poor since 740,841 (73.31%) candidate failed to choose the correct answer as shown in Figure 13.

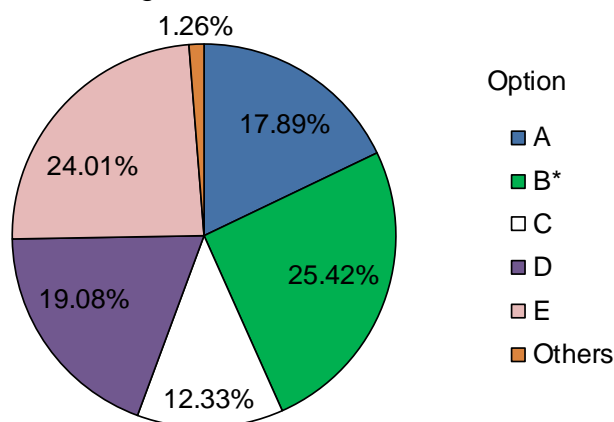


Figure 13: Candidates' Performance in Question 37

The statistics in Figure 13 show that, 73.31 per cent of the candidates failed to respond correctly to this question. These candidates chose distractors A, *the outside air temperature is wet*; C, *cold air has no moisture*; D, *the outside temperature is below 0°C* and E, *the air temperature inside is wet*. These candidates failed to understand that, during cold weather, outside the human body is colder than inside. Normally, the air in the lungs has the same temperature as that of the human body. So, as soon as you breathe out, that air comes in contact with outside air which is cold and condenses into tiny droplets of liquid water and ice which is seen in the air as smoke or clouds.

However, 25.42 per cent of the candidates selected the correct answer B, *the outside air temperature is low*. These candidates had sufficient knowledge that, smoke' comes out when you breathe in cold weather due to the outside temperature being low as compared to the air given out.

Question 38: What substances cause rusting of iron?

- A Moisture and hydrogen.
- B Carbon and oxygen.
- C Neon and oxygen.
- D Oxygen and moisture.
- E Nitrogen and moisture.

The question intended to measure candidate's understanding about the process of rusting of an iron. Statistics show that, the candidates' performance in this question was good as 653,521 (64.67%) candidates chose the correct answer D, *oxygen and moisture*. However, 347,496 (34.39%) candidates opted for incorrect answers; A, *moisture and hydrogen*; B, *carbon and oxygen*; C, *neon and oxygen* and E, *nitrogen and moisture*. Figure 14 gives the summary of the candidates performance in this question.

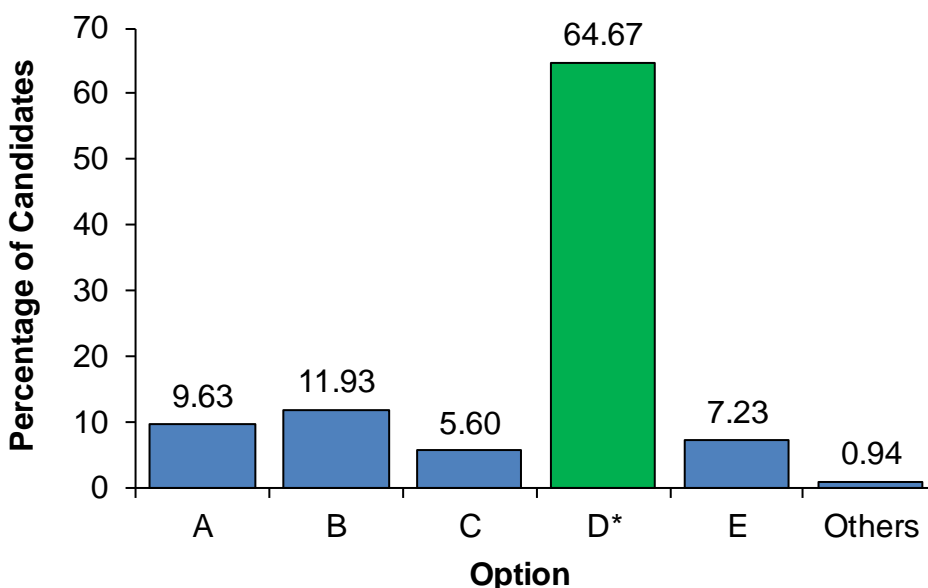


Figure 14: Candidates' Performance in Question 38

The statistics in Figure 14 shows that, 64.67 per cent of the candidates managed to respond correctly to this question. These candidates were competent enough about things which facilitate rusting of iron. They understood that, rust is the product of the reaction between iron and oxygen in the presence of moisture.

On the other hand, 34.39 per cent of the candidates failed to respond correctly to this question. These candidates had inadequate knowledge about the concept of rusting. They failed to understand that, rust is a chemical reaction that happens when iron or steel react with oxygen and water or air moisture.

Question 39: What colour is formed when lime water is mixed with the gas given out during breathing?

- A Yellow
- B Blue
- C Milky
- D Yellowish brown
- E Green

The question assessed the candidates' understanding about the product of the reaction between lime water and carbon dioxide which is the gas given out during breathing. A total of 550,843 (54.51%) candidates responded correctly to the question by choosing C, *milky*. However, 450,487 (44.58%) candidates failed to answer this question. The performance in this question was average. Figure15 gives the summary of the performance.

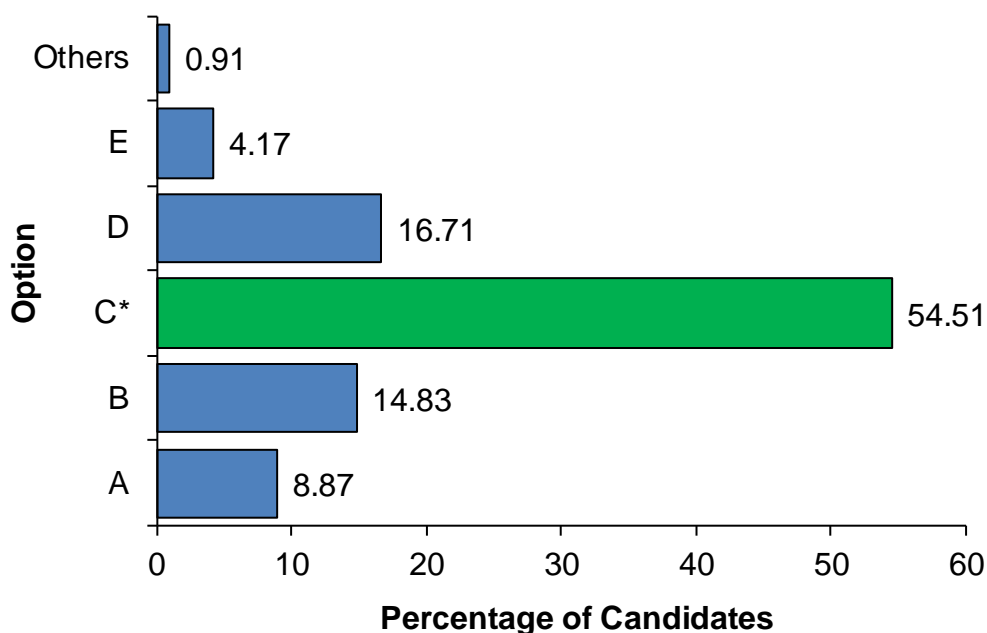


Figure 15: Candidates' Performance in Question 39

Data in Figure 15 show that this question had an average performance of 54.51 per cent. The candidates who were able to respond correctly understood that, milky colour is observed when lime water is mixed (calcium hydroxide) with the gas given out during breathing (carbon dioxide).

On the contrary, 44.58 per cent of the candidates opted for distractors A, *yellow*, B, *blue*, D, *yellowish brown* and E, *green*. These candidates failed to understand that, air given out during breathing contains carbon dioxide. They also failed to understand that lime water is calcium hydroxide hence failure to understand that, when carbon dioxide is mixed with calcium hydroxide, it produces a white precipitate of calcium carbonate.

Question 40: Which of the following chemical equation is balanced?

- | | | | |
|---|--|---|---|
| A | $\text{O}_2 + 2\text{H}_2 \rightarrow 2\text{H}_2\text{O}$. | B | $\text{O}_2 + \text{Mg} \rightarrow 2\text{MgO}$. |
| C | $2\text{Ca} + \text{O}_2 \rightarrow \text{CaO}$. | D | $2\text{Ca} + \text{Cl}_2 \rightarrow 2\text{CaCl}_2$. |
| E | $\text{H}_2\text{O} \rightarrow \text{O}_2 + 2\text{H}_2$. | | |

The question assessed the candidates' ability in balancing chemical equation. Among the 1,000,618 (99.02%) candidates who responded to this question, only 368,222 (36.44%) candidates chose the correct answer A, $O_2 + 2H_2 \rightarrow 2H_2O$. A total of 632,396 (62.58%) candidates failed to choose the correct response; instead they chose distractors B, C, D and E as shown in Figure 16.

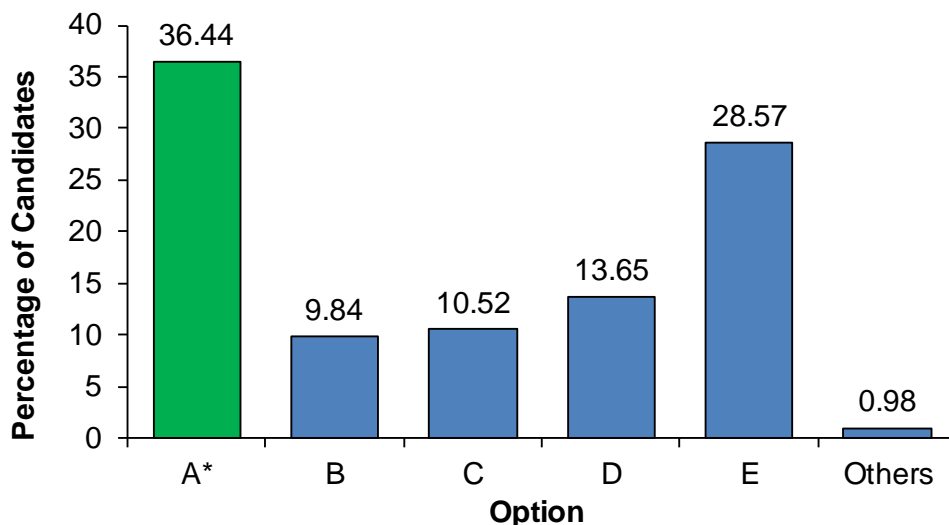


Figure 16: Candidates' Performance in Question 17

The statistics in Figure 16 show that most of the candidates (62.58%) failed to respond correctly to the question. These candidates did not know the correct steps of balancing a chemical equation, hence failed to choose the correct option. They also failed to understand that, the reactant chemical(s) are given on the left-hand side and the product chemical(s) on the right-hand side and two are connected with an arrow starting from left to the right. Also, they did not know that, the act of balancing chemical equations is governed by the law of conservation of mass which states that "*No atoms can be created or destroyed in a chemical reaction*". Hence, the number of atoms that are present in the reactants side has to balance with the number of atoms that are present in the products side.

The candidates who chose distractor B, $O_2 + Mg \rightarrow 2MgO$, failed to understand that, magnesium atoms in the equation were not balanced. The candidates who chose distractor C, $2Ca + O_2 \rightarrow CaO$, did not know that, calcium and oxygen were not balanced in the equation. Similarly, those who chose distractor D, $2Ca + Cl_2 \rightarrow 2CaCl_2$, failed to understand that, there were two calcium atoms in the reactant side while on the product side there were four atoms hence, the equation was not balanced. The same happens to those who chose distractor E, $H_2O \rightarrow O_2 + 2H_2$ as they failed to understand that, hydrogen and oxygen on both side of the equation were not balanced hence, this option was not the correct answer.

On the other hand, 36.44 per cent of the candidates managed to select the correct answer A, $O_2 + 2H_2 \rightarrow 2H_2O$. These candidates had sufficient knowledge about balancing of chemical equations, since they were able to understand that, every atom in the chemical reaction is balanced.

2.2 Section B: Short Response Questions

Question 41: State the parts that form the central nervous system.

(a) _____

(b) _____

The question assessed the candidates' understanding of the parts of the central nervous system. The performance of the candidates was good since two third (66.79%) of the candidates did well. However, 33.21 per cent of the candidates equivalent to one third, failed to write the correct responses. Figure 18 summarises the pefomance of the candidates in this question.

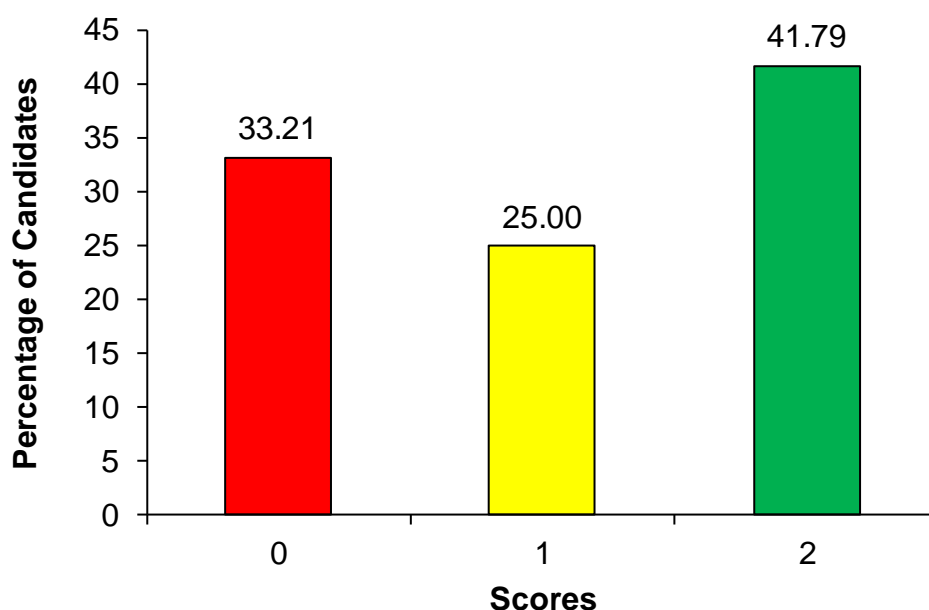


Figure 18: Candidates' Performance in Question 41

Analysis of the candidates' responses shows that, most of the candidates (66.79%) had adequate knowledge on parts of the central nervous system. They were able to identify one or both of the two parts correctly thus they scored 1 or 2 marks, respectively. Most of them, (41.79%) revealed competence in understanding the central nervous system with its parts. They were able to identify that, the *brain* and *spinal cord* are the parts of the central nervous system thus, scored all the 2 marks allocated for this question. Extract 1 shows a sample of good response from one of the candidates.

<p>41. State the parts that form the central nervous system.</p> <p>(a) <u>Brain</u></p> <p>(b) <u>Spinal Cord</u></p>
--

Extract 1.1: A sample of correct response in question 41.

Extract 1.1 shows response of the candidate who correctly stated the parts that form the central nervous system. This candidate had sufficient knowledge and skills which helped him/her to answer the question correctly.

Further analysis of the candidates responses revealed that, 25.00 per cent of the candidates who scored 1 mark, wrote only one part of the central nervous system correctly. For example, one candidate wrote the parts as *brain* and *nerve cell* of which nerve cells are not part of the central nervous system but part of the peripheral nervous system. The other incorrect responses provided by the candidates were: *brain* and *sense organs*, *brain* and *nervous system*, *brain* and *blood capillaries*, *brain* and *medulla oblongata* etc. These answers show that the candidates had inadequate knowledge of the parts of the central nervous system.

A few candidates (33.21%) failed completely to state the parts that form the central nervous system. These candidates had insufficient knowledge about the structure of the central nervous system thus, they scored 0 mark. For example, some of their responses relied on the organs of the body such as; *nose and mouth*, *skin and lungs*; others wrote parts of the brain such as; *fore brain and mid brain*. The other candidates who failed, wrote the main parts of the nervous system which are *central nervous system* and *peripheral nervous system*. Extract 1.2 shows examples of incorrect response from one of the candidates.

41. State the parts that form the central nervous system.
(a) <u>PERIPHERAL NERVOUS SYSTEM</u>
(b) <u>MOTOR NERVOUS SYSTEM</u>

Extract 1.2: A sample of the candidate's poor response in question 41.

Figure 1.2 shows the response of the candidate who named the peripheral nervous system with its components instead of the parts of the central system.

Question 42: Why do animals need oxygen gas?

The question measured candidates' knowledge of the importance of oxygen gas to animals. The performance in this question was poor since 60.18 per cent of the candidates failed to provide the correct answer. The rest of the candidates (39.82%), were able to provide the correct answer. Figure 19 summarises the performance of the candidates in this question.

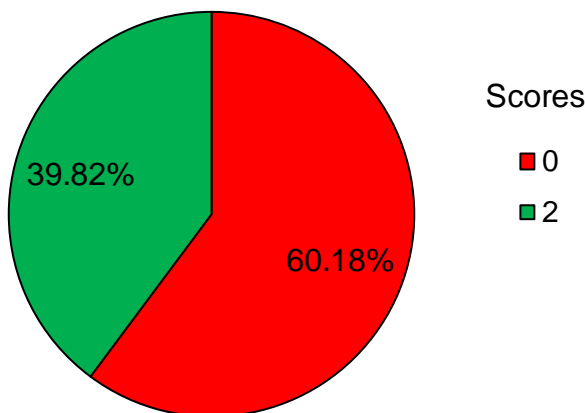


Figure 19: Candidates' Performance in Question 42

The statistics in Figure 19 show that large percentage of the candidates (60.18%) failed to respond correctly to this question. The analysis of candidates' responses shows that, these candidates had insufficient knowledge of the importance of oxygen gas to animals. For example, in answering this question, one candidate wrote; *it helps in blood transportations*, of which is not true. Also, other candidates wrote incorrect responses such as; *to fulfil their need, it is a clean air, to improve body immunity, because they exhale carbondioxide gas and for them to make their own food*. Furthermore, some of the candidates demonstrated problems in mastering writing skills. They wrote a collection of letters which had no known meaning thus, they scored 0 mark. These responses and those seen in Extract 2.1, demonstrate that the respective candidates lacked enough knowledge of the importance of oxygen gas to animals.

42. Why do animals need oxygen gas?

BECAUSE IS USED IN POLLINATION

Extract 2.1: A sample of the candidate's poor response in question 42.

Extract 2.1 shows the response of the candidate who wrote about pollination which occurs in plants instead of the importance of oxygen gas to animals.

Further analysis of the candidates' responses revealed that, 39.82 per cent of those who attempted it correctly had enough knowledge on the importance of oxygen gas to animals. They knew that, oxygen gas is needed *for respiration*. These candidates provided correct answers such as; *it is used for respiration* and *for generation of energy*. Oxygen gas is used in the body to break glucose to produce energy. The process is called respiration. These responses indicate that, the candidates were competent on the asked concept thus, they were able to provide correct responses. Extract 2.2 shows a sample of the correct response from one of the candidates.

42. Why do animals need oxygen gas?

FOR RESPIRATION

Extract 2.2: A sample of correct response in question 42.

Extract 2.2 shows the response of the candidate who correctly identified that oxygen gas is used for respiration process.

Question 43: Why is formation of water from hydrogen and oxygen called a chemical change?

The question measured the candidates' understanding about the properties of chemical changes. The performance in this question was poor as 340,888 (33.80%) candidates responded correctly while 667,590 (66.20%) failed. Figure 19 shows the distribution of scores in this question.

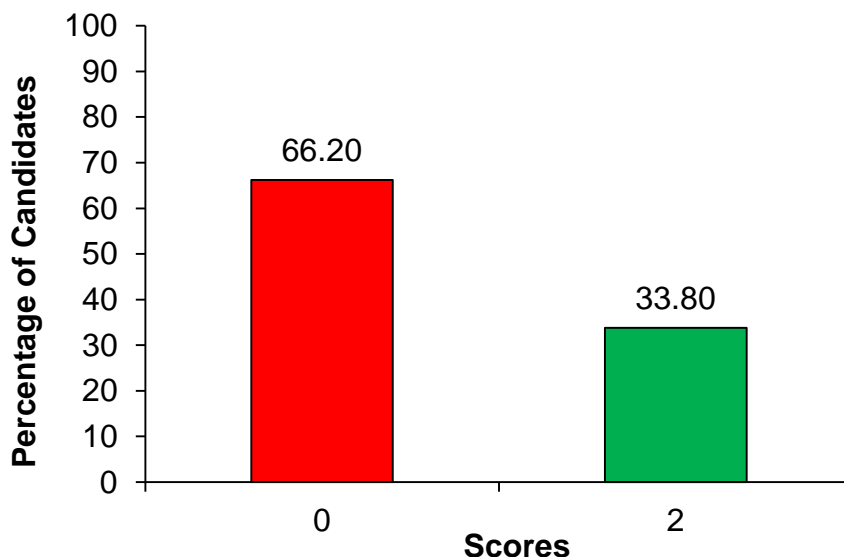


Figure 20: Candidates' Performance in Question 43

Figure 20 shows that 66.20 per cent of the candidates scored a zero mark. This indicates that the overall performance in this question was poor.

The candidates who scored a zero mark did not have enough knowledge about the concept of chemical change. For example, some of the candidates named the type of change instead of giving the reason. Other candidates wrote examples of chemical changes such as burning of grasses and rusting. Others wrote the examples of physical changes contrary to the demand of the question. Extract 3.1 represents responses from a candidate who gave incorrect answers.

<p>43. Why is formation of water from hydrogen and oxygen called a chemical change?</p> <p><u>BE CAUSE IT COMPRISES OF TWO ATOMS OF HYDROGEN AND ONE ATOM OF OXYGEN WHICH ARE CHEMICALLY COMBINED</u></p>

Extract 3.1: A sample of incorrect responses in question 43.

In extract 3.1 the candidate wrote the reason which shows the reaction of two acids instead of giving the reason asked.

On the other hand, 33.80 per cent of the candidates scored all the 02 marks allocated to this question. These candidates were able to write the correct answers such as *the properties of hydrogen and oxygen are different from the new substance (water) or a new substance is formed or there is change in weight or the components of a new substance cannot be separated by any physical means new substance is formed or new substance formed can't be separated by physical means*. These answers showed that, the candidates had enough knowledge on the concept of physical and chemical changes. Extract 3.2 shows a sample of good responses from a candidate.

43. Why is formation of water from hydrogen and oxygen called a chemical change? <i>Because it is a chemical reaction that forms a new substance that cannot be changed into original substance.</i>

Extract 3.2: A sample of good responses in question 43.

In extract 3.2, the candidate wrote the correct reason which explains the chemical change that has occurred after the reaction of hydrogen and oxygen.

Question 44: Why are pregnant women advised to test for HIV?

The question assessed the candidates' understanding of the importance of testing for HIV specifically to pregnant women. The performance of the candidates in this question was good as 71.90 per cent of the candidates responded correctly while the 28.10 per cent failed. Figure 21 shows the performance of the candidates in this question.

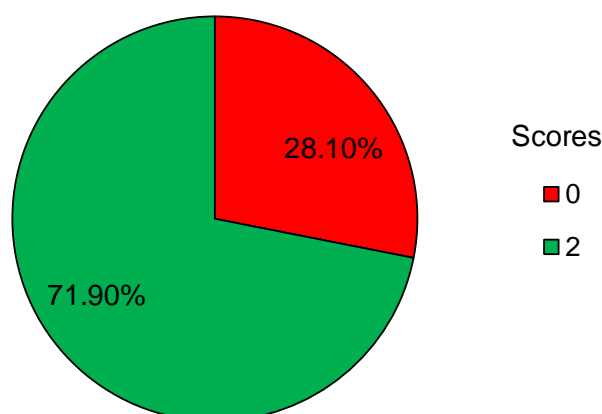


Figure 21: Candidates' Performance in Question 44

The analysis of candidates' responses shows that, most of the candidates (71.90%) were able to write the correct response since they had enough knowledge of the importance of testing for HIV to pregnant mothers. In responding to this question, these candidates wrote the variety of correct responses such as; *to avoid transmission of HIV to unborn child, to protect unborn child against HIV infection and in order to get some medicines which can hinder mother to child transmissions*. These responses show that the candidates were having enough knowledge on HIV/AIDS. Extract 4.1 shows the sample of correct response from one of the candidates.

44. Why do pregnant women advised to test for HIV?
*In order to avoid the unborn child from getting-
 HIV/AIDS infection.*

Extract 4.1: A sample of correct response in question 44.

Extract 4.1 shows the response of the candidate who wrote correctly the reason for pregnant women to be tested for HIV.

Nonetheless, 28.10 per cent of the candidates who failed to answer the question correctly lacked enough knowledge of the reason for pregnant women to test for HIV. Some of them explained a way for HIV transmission from the mother to the child such as; *through breastfeeding* instead of explaining as to why a pregnant mother should test for HIV. The other candidates wrote answers such as: *to check if they are HIV⁺, for early treatment and for safe delivery*, of which is not the correct reason.

These answers indicate that the candidates lacked enough knowledge about HIV/AIDS. Extract 4.2 shows an example of poor response from one of the candidates.

44. Why do pregnant women advised to test for HIV?
to test the blood

Extract 4.2: A sample of the candidate's poor response in question 44.

In Extract 4.2, the candidate wrote "*to test the blood*" as the reason for testing HIV to pregnant woman. This is not true as pregnant women should be tested to avoid transmission of HIV to unborn child.

Question 45: By showing the procedure, find the value of **L** in Figure 2.

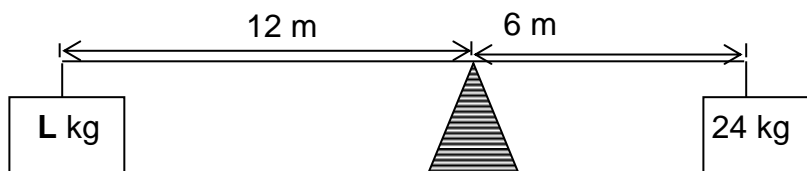


Figure 2

The question assessed the candidates' understanding about the application of the law of lever. The statistics show that, the candidates performance in this question was good since 697,065 (69.12%) scored 01 or 02 marks. Figure 21 shows distribution of the candidates' scores in this question.

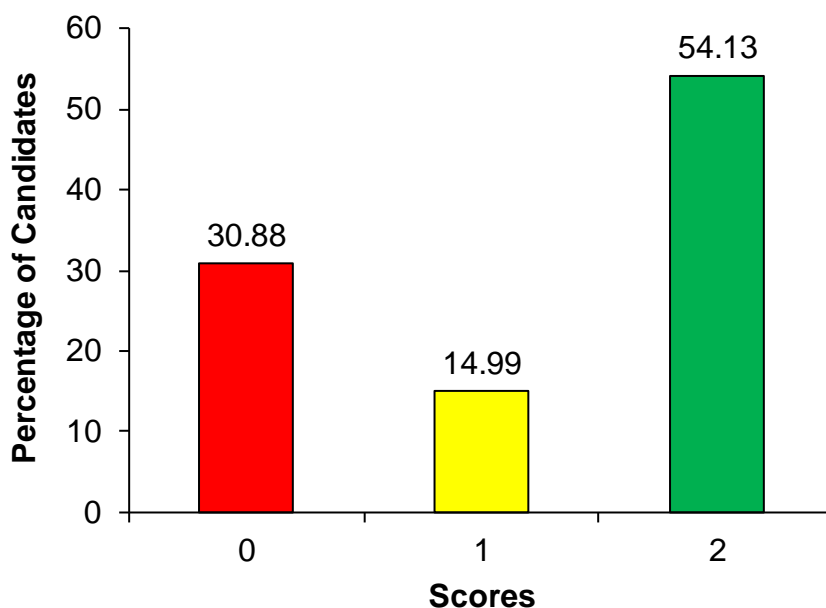


Figure 21: Candidates' Performance in Question 45

The candidates who managed to score 01 or 02 mark were able to use correctly the law of lever which states that; *“the load force multiplied by the load arm is equal to effort force multiplied by the effort arm”*. Extract 5.1 shows a sample of good responses from one of the candidates.

45. By showing the procedure, find the value of **L** in Figure 2.

Figure 2

Load \times L arm = Effort \times E arm.

$L \text{ kg} \times 12 \text{ m} = 6 \text{ m} \times 24 \text{ kg}$ \therefore Load = 12 kg.

$\frac{12 \text{ m kg}}{12 \text{ m kg}} = \frac{144 \text{ m kg}}{12 \text{ m kg}} \therefore$ Load = 12 kg.

Extract 5.1: A sample of a correct response in question 45.

Extract 5.1 shows the responses of a candidate who managed to write the correct formula, substituted the appropriate data and obtained the correct answer.

On the other hand, the candidates who scored a zero mark lacked the basic concepts of the law of levers. Most of them were unsystematic in calculating the mass **L**. For example, some candidates wrongly used the formula $\text{Load} = \frac{\text{effort}}{\text{effort arm}}$ to calculate the value of **L**. This indicated that they had inadequate knowledge on the concept of the law of levers. Similarly, others failed to simplify the mathematical relation hence, failed to arrive at the correct answer. Extract 5.2 is a sample of poor response given by one of the candidates in this question.

45. By showing the procedure, find the value of **L** in Figure 2.

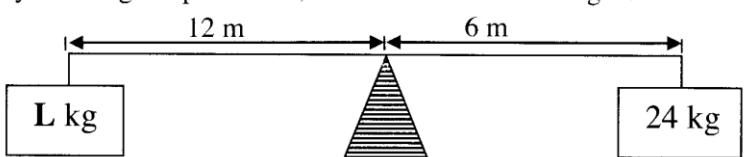


Figure 2

$$\frac{L \times 12}{24 \times 6} = \frac{12 \times 6}{24 \times 6} = \frac{12}{4} = 3 \text{ kg.}$$

Extract 5.2: A sample of incorrect responses in question 45

Extract 5.2 displays the responses of a candidate who used multiplication and division instead of using the law of lever to calculate the value of **L**.

3.0 ANALYSIS OF PERFORMANCE IN TOPICS

The science paper examined 08 topics which were *Health Services and Methods of Preventing Diseases, Essential Needs for Health and Living, First Aids, Living Things, Changes of Objects, States and Events and Living Things, States and Events*. Others were the *Methods and Procedures in Science, Energy, Machine and Work, and HIV/AIDS*.

The statistics show that four topics had good performance. The topic of *HIV/AIDS* had the highest performance (76.13%) followed by *Health Services and Methods of Preventing Diseases* (65.98%). Other topics which had good performance were *Essential Needs for Health and Living* (62.72%) as well as *Energy, Machine and Work* (60.55%). The remaining four topics had an average performance as follows: *Living Things* (58.22%), *Methods and Procedures in Science* (55.83%), *First Aids* (48.17%) and *Changes of Objects, States and Events* (45.25%).

The candidates' have maintained good performance in the topic of *HIV/AIDS* as there is an increase of 6.16 per cent as compared to the performance in this topic in the year 2019. Moreover, the performance of the candidates in the topics *Health Services and Methods of Preventing Diseases*, and *Energy, Machine and Work* has increased by 5.39 and 4.96, respectively. However, the candidates' performance in the topic of *Procedures in Science* has decreased by 20.33 from good performance to average. The topics of *Living Things*, *Methods and Procedures in Science* and *First Aid* has maintained an average performance. The summary of the candidates' performance in each topic is presented in the appendix A.

4.0 CONCLUSION

The analysis of data and the candidates' responses has shown that the general performance in science subject was good. Such good performance was influenced by the good performance in the topics of *HIV/AIDS*, *Health Services and Methods of Preventing Diseases*, *Essential Needs for Health and Living* and *Energy, Machine and Work* examined in the questions 21, 6, 11 and 24, respectively.

5.0 RECOMMENDATIONS

In order to improve the performance of the candidates in the Standard seven national examination in Science, the following are recommended:

- (a) In teaching and learning the topic of *Living Things*, teachers should make use of figures and drawings which show different

parts of plants and animals. This will help the pupils to grasp more concepts and build the long term memory.

- (b) In the process of teaching the topic of *Methods and Procedures in Science*, teachers should guide pupils to do experiments and prepare investigations reports. This will encourage and develop different skills such as investigation and presentation of information correctly.
- (c) The topic of *First Aids* should be taught by practice with actions of providing first aid to victims of different disasters through role play or by inviting health experts. This will not only help to build the long term memory to pupils, but also arouse the learners' interest to the subject matter.
- (d) Teaching of the topic of *Changes of Objects, States and Events* should be done by using real objects found in the environment like, salt, lemons, ashes, water and candles. This will enable pupils to build long term memory.
- (e) Pupils should be advised to read carefully and understand the demands of the question before attempting.

APPENDIX A

COMPARISON OF CANDIDATES' PERFORMANCE FOR EACH TOPIC IN 2020 AND 2019

S/N	Topic	PSLE 2020				PSLE 2019			
		Performance in each question		Average performance (%)	Remarks	Performance in each question		Average performance (%)	Remarks
		Question number	% performance			Question number	% performance		
1	HIV/AIDS	20	76.97	76.13	Good	17	88.97	69.97	Good
		21	79.53			18	76.75		
		44	71.90			21	71.89		
						22	59.02		
						23	49.77		
2	Health, Health Services and Methods of Preventing Diseases	5	56.94	65.98	Good	2	85.96	60.59	Good
		6	87.52			3	64.16		
		7	76.16			8	79.07		
		10	63.78			10	51.99		
		12	56.06			11	40.47		
		17	55.43			12	59.97		
						13	62.64		
						14	47.34		
						15	61.45		
						16	81.45		
						42	17.28		
						44	75.26		
3	Essential Needs for Health and Living	4	68.27	62.72	Good				
		11	89.10						
		13	78.58						
		14	47.77						
		15	67.91						
		16	43.53						
		41	66.79						
		42	39.82						
4	Energy, Machines and Work	22	46.46	60.55	Good	30	31.85	55.59	Average
		23	66.68			31	87.5		
		24	88.38			32	43.35		
		25	51.42			33	47.12		

S/N	Topic	PSLE 2020				PSLE 2019			
		Performance in each question		Average performance (%)	Remarks	Performance in each question		Average performance (%)	Remarks
		Question number	% performance			Question number	% performance		
		26	73.43						
27	32.15	35	85.87						
28	56.77	36	26.19						
45	69.12	37	54.08						
		38	50.55						
		41	60.79						
		45	84.46						
5	Living Things	1	37.99	58.05	Average			1	84.44
		2	52.05			4	33.99		
		3	84.73			9	27.62		
		8	65.68						
		9	45.29						
		18	40.89						
		19	79.69						
6	Methods and Procedures in Science	29	48.26	55.83	Average	39	56.19	43.07	Average
		32	57.35			40	29.96		
		33	60.06						
		34	57.66						
7	First Aid	30	15.13	48.17	Average	19	36.19	54.80	Average
		31	81.22			20	73.41		
8	Changes of Objects, States and Events	35	47.01	45.25	Average	24	73.03	65.58	Good
		36	56.30			25	49.66		
		37	24.01			26	59.09		
		38	64.67			27	72.7		
		39	54.51			28	62.27		
		40	36.44			29	76.75		
		43	33.80						

APPENDIX B

**A SUMMARY OF COMPARISON OF THE CANDIDATES PERFORMANCE BY TOPIC IN PSLE 2019 AND PSLE 2020
SCIENCE SUBJECT**

