

THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA



**CANDIDATES' ITEM RESPONSE ANALYSIS
REPORT FOR THE PRIMARY SCHOOL LEAVING
EXAMINATION (PSLE) 2019**

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) 2019 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 candidates' responses to the questions is among the indicators showing that the candidates were able/not able to learn effectively in the 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 candidates to be able or not able to provide correct responses according to the requirement of specific question. Some of the reasons for candidates to respond correctly include 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 and misunderstanding the task of the question, hence giving responses not related to the asked questions.

The Examination Council expects that the feedback provided in this report will enlighten education stakeholders on the trend of education in the primary education level, hence to take necessary steps towards improving the teaching and learning of Science subject so as to improve more the performance of candidates 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

The Primary School Leaving Examination (PSLE) is an exit examination that is held in the second week of September each year. In this year, the examination was conducted on 11th and 12th September 2019.

This report is based on the analysis of the performance of the candidates who sat for the PSLE 2019 in the Science subject. In general, the report presents the data and descriptions concerning the performance of the candidates per question and by topics.

The report has five sections, namely, introduction, analysis of the candidates' performance in each question and topic, conclusion and recommendations. The summary of performance per topics is shown in the Appendix A. 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.

The data show that a total of 947,077 candidates were registered for PSLE 2019, out of which 933,323 (98.55%) sat for the examination. The analysis of performance indicates that 778,331 (83.50%) candidates passed. This performance is an increase of 6.90 per cent when compared to the performance of PSLE of 2018 where 76.60 per cent passed.

2.0 THE ANALYSIS OF THE CANDIDATES' RESPONSES

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

2.1 Section A: Multiple Choice Questions

The analysis of the performance of candidates on questions 1 to 40 is as follows:

Question 1: Which of the following animals is a mammal?

- A Snail
- B Duck
- C Bat
- D Lizard
- E Frog

The question measured candidates' to identify the mammals in the group of animals. The question was attempted by 930,847 (99.73%) candidates out of which 788,052 (84.44%) responded to correctly. The rest, 142,795 (15.30%) candidates failed to identify the correct response as they chose among the distractors A, B, D and E. The distribution of the number of candidates against their options is given in Figure 1.

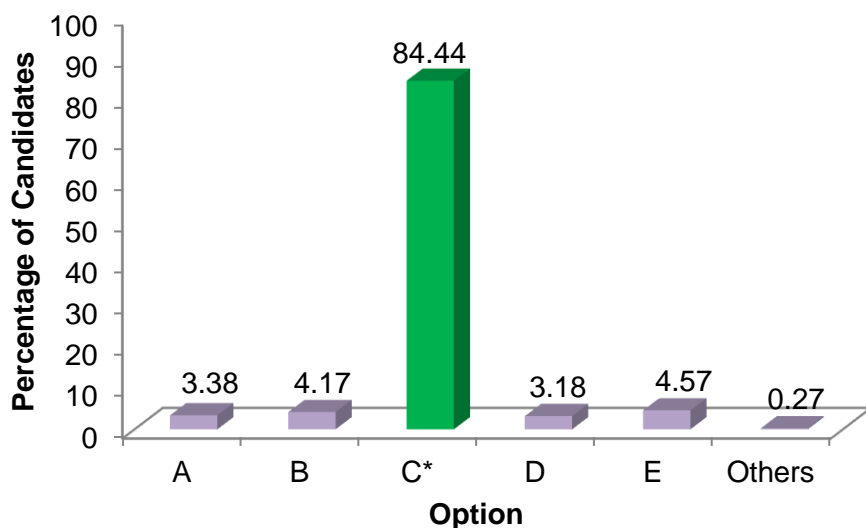


Figure 1: Candidates' Performance in Question 1

The candidates who chose the correct response C, *bat* were aware of the characteristics of mammals. They recognised that the characteristics of mammals include the possession of mammary glands and hair/fur that cover their bodies. Therefore, they were able to identify that among the listed animals, only bat possesses such characteristics.

A few candidates (15.30%) who failed to choose the correct response did not know the characteristics of different groups of animals. All animals in distractors A, B, D and E are not in class of mammals because they lack mammary glands and hair covering their bodies. They belong to other classes of animals. For example frog is in class amphibia; lizard is in class reptilia; duck in class Bird/Aves and snail is in class gastropoda.

Question 2: Body cleanliness helps to prevent skin diseases such as

- A syphilis and chlamydia
- B swelling and rashes
- C tetanus and elephantiasis
- D whooping cough and tuberculosis
- E AIDS and gonorrhea.

The question assessed candidates' knowledge of diseases and their causes. The question was attempted by 930,883 (99.73%) candidates. The general performance was good as 802,249 (85.96%) candidates responded to correctly to the question. On the other hand, 128,634 (13.78%) failed to answer it correctly. Figure 2 summarises the performance of the candidates in this question.

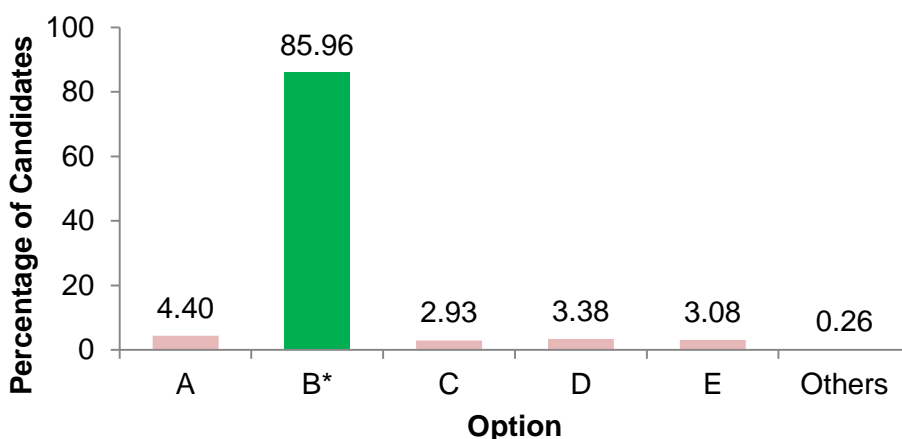


Figure 2: Candidates' Performance in Question 2

As observed in Figure 2, the majority of the candidates (85.96%) chose the correct option B, *swelling and rashes*. These candidates managed to recognise that swelling and rashes are the diseases affecting the skin and are caused by poor body hygiene. The choice of this response implies that the candidates had adequate knowledge of types of diseases and their causes.

Further analysis of data revealed that a few candidates (13.78%) failed to respond to the question correctly. These candidates lacked knowledge of the causes of diseases. For example, the candidates who chose options A, *syphilis and chlamydia* and the one who chose E, *AIDS and gonorrhea* did not know that those are sexually transmitted diseases. On the other hand, the candidates who chose option C, *tetanus and elephantiasis* and D, *whooping cough and tuberculosis* were unaware that tetanus, whooping cough and tuberculosis are bacterial infection diseases and elephantiasis is caused by filarial worm which is transmitted by female mosquitoes.

Question 3: Fruits and green vegetables are in the group of food containing

- A proteins
- B carbohydrates
- C fats
- D vitamins
- E starch.

This question measured candidates' ability to identify different types of food into their respective groups. The question was attempted by 929,348 (99.57%) candidates. Their performance was average since 598,850 (64.16%) chose correct response. The rest, 330,498 (35.41%) failed to respond as they chose among the distractors A, B, C na E as shown in Table 1.

Table 1: Number and percentage of candidates' choice in each option

Option	A	B	C	D*	E	Others
No. of Candidates	186,681	68,499	25,861	598,850	49,457	3,975
% of Candidates	20.00	7.34	2.77	64.16	5.30	0.43

Data in Table 1 show that 64.16 per cent of the candidates managed to choose the correct response D, *vitamins*. These candidates had knowledge of nutritional contents of different types of food, hence classified them into their respective groups correctly.

Further analysis indicates that the candidates who failed opted for distractors A, B, C and E. These candidates were unaware of nutrition contents of different types of food. They failed to understand that protein is found in food substances such as all kinds of meat, milk and leguminous plants. Carbohydrate is found in all kinds of cereals and sugar, fat is found in fatty food, fatty meat and nuts while starch is found in all cereals and roots such as cassava.

Question 4: Why does a plant disperse its seeds after maturity?

- A In order to be taken by animals.
- B In order to flourish properly.
- C In order to increase nutrients.
- D In order to decrease reproduction.
- E In order to germinate quickly.

The question intended to measure candidates' understanding of the importance of seed dispersion to plants. The question was attempted by 933,323 (99.10%) candidates. The performance of the candidates on this question was poor since only 317,242 (33.99%)

candidates responded to it correctly. Most of them 616,081 (66.01%) failed to respond correctly. Table 2 summarises the performance of candidates in this question.

Table 2: Number and percentage of candidates' choice in each option

Option	A	B*	C	D	E	Others
No. of Candidates	78,918	317,242	224,320	117,545	186,897	8,401
% of Candidates	8.46	33.99	24.03	12.59	20.02	0.90

Statistics in Table 2 shows that only one third of the candidates were able to choose the correct response B, *in order to flourish*. These candidates understood that for a plant to flourish, it needs water, nutrients, air and sunlight energy. The seed that falls under the parent plant may fail to flourish due to competition of those important needs.

However, the two thirds failed to respond to this question correctly. These candidates were not aware of the concept and importance of seed dispersion. For example, 36.62 per cent who chose distractors C, *in order to increase nutrients* and D, *in order to decrease reproduction* were unaware that seed dispersal is the mechanism of transporting seeds to new sites. This mechanism enables the seed to get its basic needs for germination and flourishing. Moreover, those who chose distractor A, *in order to be taken by animals* could not understand that animals are the agents of seed dispersion.

Question 5: Which fruit is not a result of pollination?

- A Water melon
- B Tomato
- C Banana
- D Orange
- E Lemon

The question measured candidates' ability to identify a fruit that is not produced through pollination. A total of 927,492 (99.37%) candidates attempted this question. The overall performance was

average as half of the candidates (50.04%) responded to the question correctly. However, 49.33 per cent of the candidates failed. Table 3 shows the performance statistics in this question.

Table 3: Number and percentage of candidates' choice in each option

Option	A	B	C*	D	E	Others
No. of Candidates	236,401	89,896	467,005	49,220	84,970	58,31
% of Candidates	25.33	9.63	50.04	5.27	9.10	0.62

The candidates who were able to choose the correct response C, *banana* were aware of the process of pollination in plants. They knew that pollinated fruits must contain mature seeds that can germinate to form a new plant. This knowledge helped them to understand that bananas are not formed as a result of pollination.

On the other hand, the candidates who opted for the responses A, B, D and E were not aware of the process of pollination in plants. They failed to recognise the fruit whose production does not pass through pollination is banana. The fruits in the incorrect options contain mature seeds that are formed as a result of pollination.

Question 6: When the seed is germinating which direction does the embryo grow?

- A Upwards
- B To the right
- C To the left
- D At the centre
- E Downwards

This question measured candidates' understanding of the process of germination in plants. Out of 927,051 (99.32%) candidates who attempted this question, 547,011 (58.61%) chose the correct response, implying an average performance. However, 380,040 (40.71%) failed as they chose among the distractors B, C, D and E instead of the correct response A *upwards*. The candidates' performance in this question is shown in Figure 3.

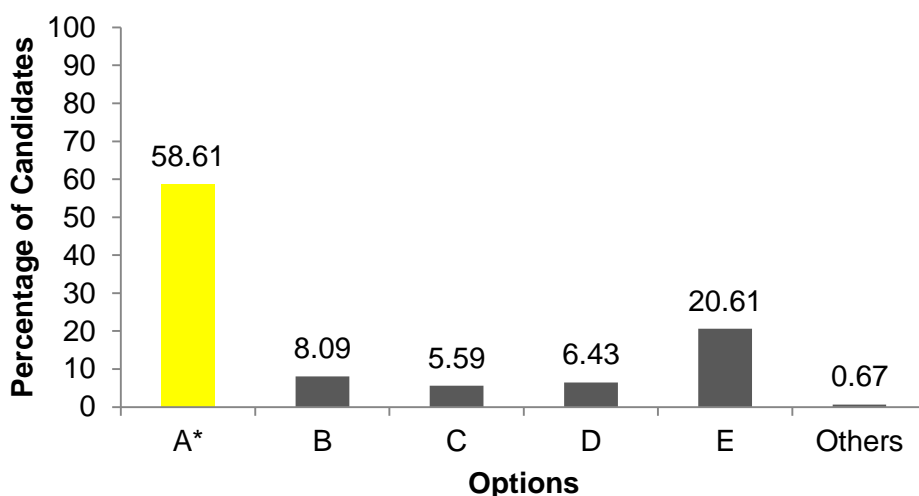


Figure 3: Candidates' Performance in Question 6

The statistics in Figure 3 shows an average performance on this question since 58.61 percent of candidates chose the correct response A, *upwards*. These candidates understood that during germination, a newly formed plant grows upwards in search for sunlight for photosynthesis process. They could also use knowledge of germination of most plants they experience in daily environment.

The remaining candidates (40.71%) were not aware that plants grow upward in search for sunlight. Similarly, they could not use daily experiences of plants growth as a result they responded to incorrectly to the question.

Question 7: How many kidneys does the human body possess?

- A One
- B Five
- C Three
- D Two
- E Four

The question assessed candidates' understanding of the organs that form the human body. A total of 930,055 (99.65%) candidates attempted this question, out of which 791,712 (84.83%) answered correctly and 138,343 (14.82%) failed. Data show that this question was responded to well by most of the candidates implying a good

performance. Table 4 shows a summary of candidates' performance statistics in this question.

Table 4: Number and percentage of candidates' choice in each option

Options	A	B	C	D*	E	Others
No. of candidates	78,858	27,889	18,077	791,712	13,519	3,268
% of candidates	8.45	2.99	1.94	84.83	1.45	0.35

As observed in Table 4, most of the candidates, (84.83%) were able to choose the correct response D, *two*. These candidates knew that there are two kidneys in the human body located on either sides of the spine.

On the other hand, a few candidates (14.82%) who chose incorrect responses A, B, C and E lacked knowledge of different organs that make up the human body. They failed to recognise that there are two kidneys in the human body and not otherwise.

Question 8: What will happen if the nervous system in human body will not work?

- A 2The person will shiver
- B The person will feel weak
- C The person will feel severe pain
- D There will be no body communications
- E The person will reduce weight.

The question measured candidates' understanding of the function of the nervous system in human body. A total of 929,366 (99.58%) candidates attempted this question out of which 738,014 (79.07%) responded to it correctly while 191,352 (20.50%) failed. Generally, the performance of the candidates in this question is good as summarized in Figure 4.

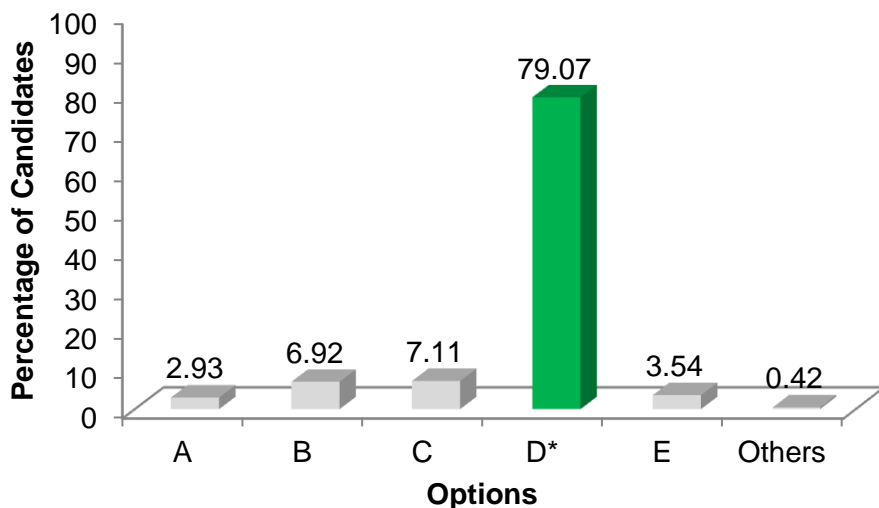


Figure 4: Candidates' Performance in Question 8

The statistics in Figure 5 show that most of the candidates (79.07%) were able to choose the correct response. These candidates understood the functions of the nervous system. They knew that the nervous system is a network of nerves and cells that carry messages to and from the brain and spinal cord to various parts of the body. They were able to identify that option D, *there will be no body communications* is the correct response since the nervous system is responsible for body communications.

Nevertheless, few candidates (20.50%) chose among the incorrect responses A, B, C and E. These candidates lacked knowledge of the function of the central nervous system. They did not understand that the central nervous system is responsible for body communications therefore; failure of the nervous system will lead to failure in body communications.

Question 9: Which is the characteristic of monocotyledonous plant?

- A To fertilize the soil
- B To conserve water in the soil
- C To possess one tap root
- D To possess many roots
- E To have two cotyledons

This question assessed candidates' ability to identify the characteristics of the monocotyledonous plants. The general performance of the candidates in this question is poor since out of 926,625 (99.28%) candidates who attempted this question only 257,813 (27.62%) were able to choose the correct response D, *to possess many roots*. However, 668,812 (71.6%) chose among the distractors A, B, C and E. Table 5 summarises candidates' performance in this question.

Table 5: Number and percentage of candidates' choice in each option

Options	A	B	C	D*	E	Others
No. of Candidates	67,982	86,038	23,9572	257,813	275,220	6,698
% of Candidates	7.28	9.22	25.67	27.62	29.49	0.72

Table 5 shows that most of the candidates (72.38%) failed to choose the correct response. Among them, 55.16 per cent chose distractors C, *to possess one taproot* and E, *to have two cotyledons*. These candidates did not understand those are the characteristics of dicotyledonous. In addition, the remaining 16.50 per cent chose distractors A, *to fertilize the soil* and B, *to conserve water in the soil*. These did not know that the soil can be fertilized by leguminous plants such as beans and peas but not monocotyledons. Like wise, conservation of water in the soil can be done by adding organic matter, not through planting.

However, a few candidates (27.62%) who were able to choose the correct response understood the characteristics features of monocotyledonous plants. They knew that monocotyledons possess one cotyledon in the seed, adventitious roots and parallel veined leaves.

Question 10: The cholera germs enter into the body through

- A the skin
- B the wound
- C the eyes
- D the mouth
- E the ear.

The question measured candidates' ability to identify the entry point of cholera germs in the body. A total of 928,399 (99.47%) candidates attempted this question out of which 485,247 (51.99%) responded to it correctly and 443,152 (47.48%) chose among the wrong responses. The general performance in this question is average as statistics presented in Table 6.

Table 6: Number and percentage of candidates' choice in each option

Option	A	B	C	D*	E	Others
No. of Candidates	254,384	145,290	24,145	485,247	19,333	4,924
% of Candidates	27.26	15.57	2.59	51.99	2.07	0.53

Data in Table 6 show that 51.99 per cent of the candidates responded to this question correctly. These candidates were aware that cholera germs (bacteria) enter the body through eating food or drinks contaminated with those bacteria. Therefore, they were able to identify the correct response D, *the mouth*.

However, 47.48 per cent of the candidates could not recognise that the cholera germs enter the body through the mouth. These candidates chose among distractors A, *the skin*, B, *the wound*, C, *the eyes* and E, *the ear*. This is an indicator that these candidates lacked knowledge of cholera disease. They could not realise that cholera is spread through drinking water or eating contaminated food.

Question 11: Which kind of foods a diabetic person is supposed to eat more?

- A Carbohydrates and protein.
- B Vitamins and fat.
- C Fruits and fat.
- D Protein and green vegetables.
- E Mineral salts and green vegetables.

This question measured candidates' understanding of care of diabetic person. The question was attempted by 924,772 (99.08%) candidates out of which 377,702 (40.47%) gave a correct response while 547,070 (58.61%) failed. The number of candidates in each option is summarized in Table 7.

Table 7: Number and percentage of candidates' choice in each option

Options	A	B	C	D*	E	Others
No. of Candidates	193,513	78,953	53,023	377,702	221,581	8,551
% of Candidates	20.73	8.46	5.68	40.47	23.74	0.92

Statistics in table 7 show that the general performance of the candidates in this question was average. About 58.61 per cent of the candidates failed to choose the correct response D, *protein and vegetables*. These candidates lacked knowledge of care of diabetic victims. Those who opted for distractor A, *carbohydrates and protein* were unaware that the diabetic person should not take much carbohydrate because it elevates amount of sugar in the blood. Those who opted for B, *vitamin and fats* and C, *fruits and fat* did not understand that an increased level of fat in the body is harmful since most of the fruits elevate level of sugar in the body. For those who chose option E, *mineral salts and green vegetables* could not understand that such meals can not be used as main food on daily basis as they can weaken the body.

On the other hand, 40.47 per cent of the candidates were aware that an option D, protein and green vegetable is the correct response. These candidates understood that within protein, the patient can get other important nutrients such as fat in sufficient amount. They also

knew that the diabetic person needs green vegetables which contain vitamins for protecting the body against other diseases.

Question 12: A person who does not eat food which contains iodine is likely to get which disease?

- A Beriberi.
- B Goiter.
- C Anemia.
- D Scurvy.
- E Rickets.

This question assessed candidates' understanding on the importance of iodine minerals in the body. The question was attempted by 927,774 (99.41%) candidates, out of which 559,739 (59.97%) responded to it correctly and 368,035 (39.43%) failed. The distribution of number of candidates in each option is summarised in Table 8.

Table 8: Number and percentage of candidates' choice in each option

Option	A	B*	C	D	E	Others
No. of Candidates	77,320	559,739	125,782	74,982	89,951	5,549
% of Candidates	8.28	59.97	13.48	8.03	9.64	0.59

Table 8 shows that the overall performance of the candidates in this question was average since 59.97 per cent were able to choose the correct response B, *goiter*. These candidates understood that deficiency of iodine in the body causes enlargement of the thyroid gland which appears as a swelling in the neck known as goiter.

However, the rest of the candidates opted for distractors A, C, D and E. This shows that they were unaware of the importance of iodine minerals in the body. For example, those who chose option C, *anemia* did not know that anemia is caused by decrease in number of red blood cells and not lack of iodine in the body. Likewise, the candidates who opted for other distractors lacked knowledge on the causes of those diseases as they are not caused by lack of iodine in

the body. For example, scurvy is caused by lack of vitamin C, ricket by lack of calcium and Beriberi by vitamin B.

Question 13: What is the function of bone marrow?

- A Protect the bones.
- B Manufacture blood cells.
- C Prevent spread of diseases.
- D Collect all body wastes.
- E Conserve heat for the bones.

The question assessed candidates' ability to identify the function of bone marrow. The performance of the candidates in this question was average as out of 927,839 (99.41%) candidates who attempted the question, 584,616 (62.64%) responded to it correctly. However, 343,223 (36.77%) candidates failed to respond correctly as shown in Figure 5.

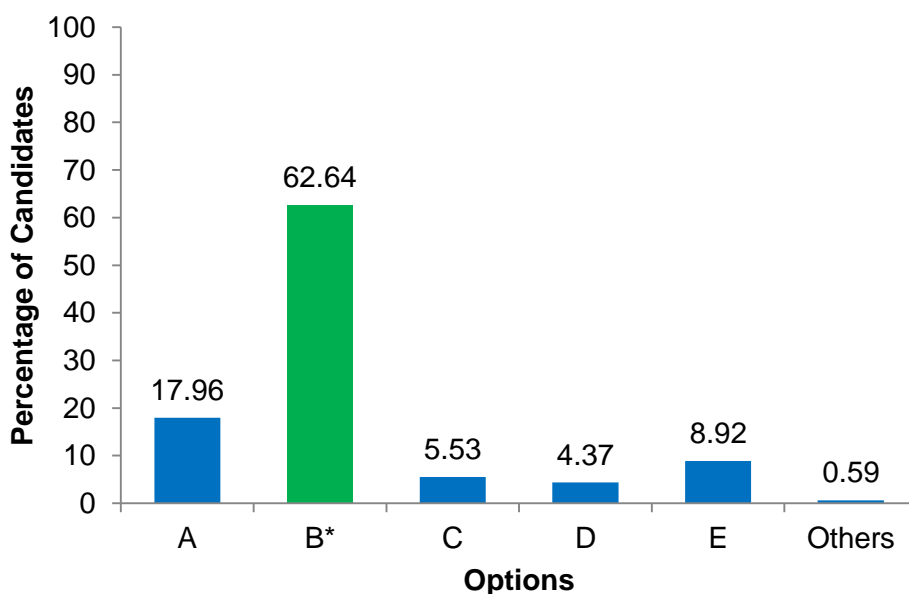


Figure 5: Candidates' Performance in Question 13

Figure 5 shows that the performance was average as 62.64 per cent of the candidates chose the correct response. These candidates had enough knowledge of the parts of the bones and their function. These candidates understood that the bone marrow is the site for

production of new blood cells and hence they chose B, *manufacture blood cells*.

On the other hand, 36.77 per cent of the candidates who opted for incorrect options A, C, D and E lacked knowledge of the function of bone marrow. Most of them (17.96%) opted for incorrect response A, *to protect the bones* since they were unaware that the function of bone marrow is to manufacture blood cells and not to protect the bones.

Question 14: Family planning method which is safer for the health of the mother is

- A Loop
- B Natural method
- C Injection
- D Pills
- E Condom

The question intended to measure candidates' knowledge of the candidates on methods of family planning, their advantages and disadvantages. The candidates were supposed to identify a method which is safe to the mother among other methods. The overall performance of the candidates in this question was average, as Table 9 shows.

Table 9: Number and percentage of candidates' choice in each option

Options	A	B*	C	D	E	Others
No. of Candidates	89,270	441,802	92,225	76,633	228,485	4,908
% of Candidates	9.56	47.34	9.88	8.21	24.48	0.53

Table 9 shows that 47.34 per cent of the candidates managed to choose a correct response by choosing letter B, *natural method*. These candidates understood that the natural methods such as periodic abstinence do not involve pills or devices inserted in the woman body. They understood the side effects of other family

planning methods such as use of loops and injection the knowledge which helped them to choose the correct response.

Nevertheless, 52.14 per cent of the candidates could not choose the correct response. These candidates lacked knowledge of advantages and disadvantages of various methods of family planning which could have helped them to identify a safe method among the given alternatives. The distractor E, *condom* attracted most of them (24.48%) because they knew that it does not involve use of pills or devices inserted in woman body. Yet, this method is not safe as condoms can burst during the process and lead to unplanned pregnancies. Similarly, the other listed methods like loop, injection, and pills have side effects to the women. For example, injection may cause unexpected increase/loss of body weight to a mother.

Question 15: Which of these diseases is caused by bacteria?

- A Beriberi
- B Tuberculosis
- C AIDS
- D Bilharzia
- E Diabetes

This question assessed candidates' ability to identify a disease caused by bacteria. The question was attempted by 929,598 (99.60%) candidates in which 573,559 (61.45%) candidates responded to correctly while 356,039 (38.15%) failed, thus they chose among the distractors A, C, D and E. The number of candidates' choices in each option is given in Table 10.

Table 10: Number and percentage of candidates' choice in each option

Options	A	B*	C	D	E	Others
No. of Candidates	69,207	573,559	78,589	176,044	32,199	3,725
% of Candidates	7.42	61.45	8.42	18.86	3.45	0.40

Table 10 portrays that 61.45 per cent of the candidates identified that B, *tuberculosis* is the disease caused by bacteria. These candidates had enough knowledge of the germs that transmit diseases. They knew that tuberculosis is the air-borne disease caused by the bacteria.

Nevertheless, 38.15 per cent of the candidates failed to choose correct responses since they did not know the causes of diseases. They failed to recognise that tuberculosis is caused by bacteria. For example, those who chose distractor D, *bilharzia*, failed to understand that bilharzia is caused by parasitic worms. Similarly, AIDS is caused by viruses, beriberi by deficiency of vitamin B in the body and diabetes is due to lack of insulin.

Question 16: A breast-feeding mother is supposed to be

- A more aged
- B near the hospital
- C entrepreneur
- D clean all the time
- E with secondary education

The question assessed candidates' understanding on the responsibility of a breast-feeding mother on child's health care. The performance of the candidates in this question was good as more than three quarters of the candidates (81.45%) managed to respond to it correctly while few of them (18.20%) failed. Figure 6 gives a summary of performance of the candidates.

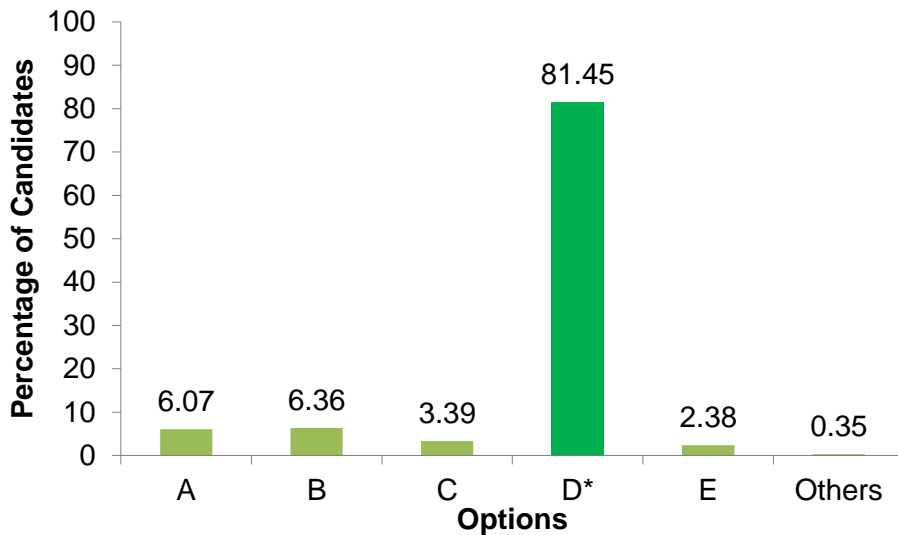


Figure 6: Candidates' Performance in Question 16

The statistics in figure 6 show that the question was well performed by most of the candidates (81.45%). These candidates were able to identify that option D, *clean all the time* is the correct response to this question. A good performance of the candidates in this question indicates that they knew the responsibility of a breast-feeding mother for the health of the child.

However, few candidates (18.20%) failed to realize that a breast-feeding mother is responsible for the health of the child hence needs to be clean all the time. They chose responses which do not apply to the qualities of the breast-feeding mother. For example, those who chose distractor A, *more aged* did not know that childbearing age is limited. Also, those who chose distractor B, *near the hospital* failed to know that it is sick people who need to be near a hospital and not breast-feeding mothers.

Question 17: Many venereal diseases are spread through

- A sexual intercourse
- B breathing air
- C sharing clothes
- D touching the victim
- E blood transfusion

The question assessed candidates' ability to identify common way through which venereal diseases are spread. A total of 930,020 (99.65%) candidates attempted this question, out of whom 830,380 (88.97%) responded to correctly. Few candidates, 99,640 (10.68%) failed to respond correctly. Generally this question was the best performed. Figure 7 shows a summary of the performance of the candidates.

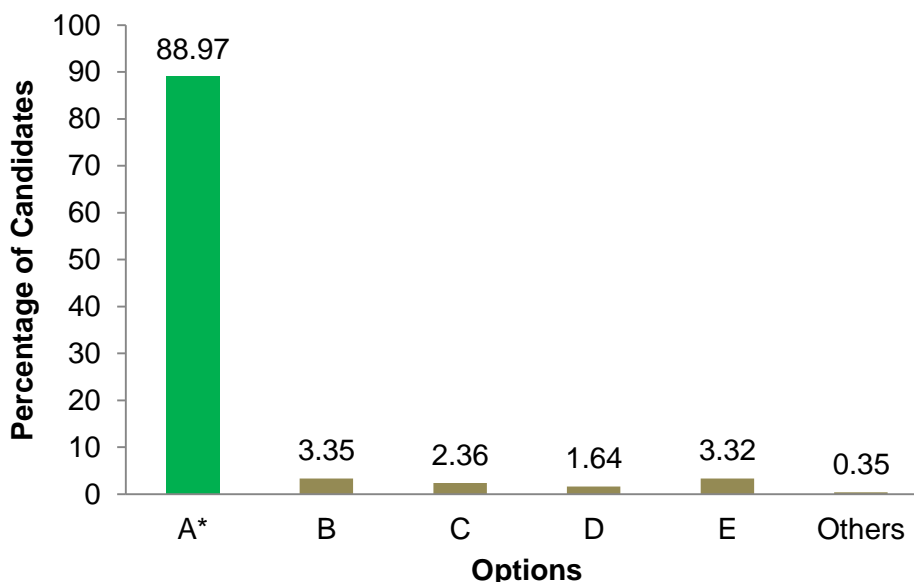


Figure 7: Candidates' Performance in Question 17

Figure 7 shows that more than four fifth (88.97%) of the candidates who managed to recognize the correct response A, *sexual intercourse* were aware that venereal diseases are commonly spread through sexual intercourse. This is because apart from classroom teaching, the knowledge is also provided through different media such as radio, television, flyers and magazines. This helped a large number of the candidates to be able to respond to the question correctly.

On the other hand, a few candidates (10.68%) who failed to respond correctly to this question were unable to understand that of all the alternatives given; only sexual intercourse spreads venereal diseases. For example, those who chose distractor B, *breathing air* did not know that breathing air does not spread venereal diseases.

Additionally, those who chose distractor E, *blood transfusion* did not know that some venereal diseases like syphilis and gonorrhoea are not transmitted through blood transfusion. .

Question 18: Which is the advantage of family planning to the society?

- A Diseases are reduced in the society.
- B Children get big age difference.
- C Doctors get time to rest.
- D Number of children sent to the clinic is reduced.
- E Children get good care and education.

The question assessed candidates' ability to identify advantages of family planning to the society. The question was attempted by 928,727 (99.51%) candidates, out of which 716,357 (76.75%) responded to correctly and 212,370 (22.75%) failed. The general performance of the candidates in this question is good as shown in Table 11.

Table 11: Number and percentage of candidates' choice in each option

Options	A	B	C	D	E*	Others
No. of Candidates	66,622	90,211	24,485	31,052	716,357	4,596
% of Candidates	7.14	9.67	2.62	3.33	76.75	0.49

The statistics in Table 11 shows that many candidates (76.75%) were able to respond correctly to this question. These candidates had knowledge of the advantages of family planning. They knew that through family planning, people can attain the desired number of children. This enables the parents to provide each child with basic needs like education, health care and food.

However, the candidates who failed to choose the correct response were unaware of the important in family planning to the society. For example, those who chose distractors A, *diseases are reduced in the society* and B, *children get big age difference* did not know that these responses are not importance of family planning. Those who chose distractors C, *doctors get time to rest* and D, *number of*

children sent to the clinic is reduced did not know that the responses are not related to family planning.

Question 19: How can a person with broken bone be identified?

- A Through touching the whole body.
- B Observation of the wound.
- C Failure to use the joint.
- D Swelling of the broken area.
- E Excessive bleeding.

The question assessed candidates' ability to identify indicators of broken bone. The question was attempted by 928,353 (99.47%) candidates out of which 337,781 (36.19%) responded to it correctly and 590,572 (63.27%) failed. Generally, the candidates' performance in this question was poor as seen in Figure 8.

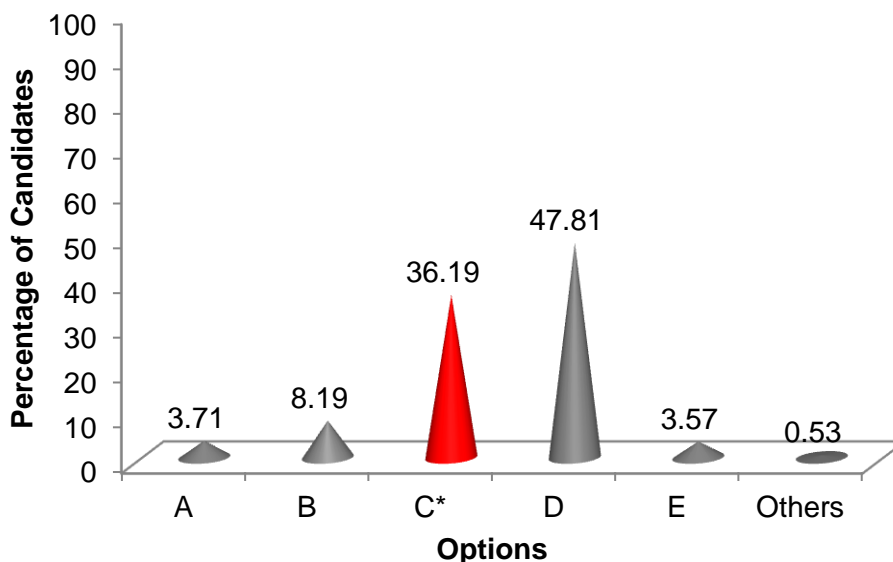


Figure 8: Candidates' Performance in Question 19

Data in Figure 8 show that a large number of the candidates (63,81%) failed to choose the correct response. These candidates did not know the indicators of broken bone hence could not identify that the option C, *failure to use the joint* is the correct response. Most of them (47.81%), chose distractor D, *swelling of the broken area* since they did not know that swelling of part of the body is not an indicator of broken bone but any type of body inflammations can

cause swelling. Like wise, those who chose distractor B, *observation of the wound* and E, *excessive bleeding* were unaware that those symptoms are not necessarily accompanied by broken bone.

Nevertheless, a few candidates (36.19%) managed to respond correctly to this question. These candidates had adequate knowledge of indicators of the broken bone. They knew that a person with broken bone fails to use the affected organ. They also knew that the presence of wounds, swellings and excessive bleeding do not imply broken bone.

Question 20: Bahati failed to stand up while playing because of severe pain in her leg. This condition was caused by:

- A Relaxed muscles.
- B Contracted muscles.
- C Hotness of the play ground.
- D Coldness of the play ground
- E Numbness attack.

The question measured candidates' understanding about the causes of severe muscles pain during body exercises. The question was attempted by 929,180 (99.60%) candidates, out of which 685,152 (73.41%) responded to it correctly. However, 244,025 (26.15%) candidates failed to respond to this question correctly by choosing among the distractors A, C, D, and E, as summarised in Table 12.

Table 12: Number and percentage of candidates' choice in each option

Options	A	B*	C	D	E	Others
No. of Candidates	131,429	685,152	27,214	28,676	56,709	4,143
% of Candidates	14.08	73.41	2.92	3.07	6.07	0.44

Most of the candidates (73.41%) were able to choose the correct response B, *contracted muscles* because they were aware that during body exercises, muscles contraction causes severe leg pain to the extent that one fails to stand up.

Nevertheless, a few candidates (26.15%) failed to respond to this question correctly since they were unaware that contraction of muscles causes severe pain. For example, those who chose distractor A, *relaxed muscles* did not know that muscle relaxation causes body to be at ease, therefore cannot cause severe pain. Also those who chose distractors C, *hotness of the playground* and D, *coldness of the playground* did not know that hotness or coldness does not cause pain during exercises.

Question 21: Which sentence gives the correct meaning of AIDS?

- A Loss of body immunity.
- B High body immunity.
- C Absence of body immunity.
- D Deficiency of body immunity.
- E Ability of body immunity.

The question assessed candidates' understanding of the concept of AIDS. The general performance of the candidates in this question was good as out of 929,340 (99.56%) candidates who attempted the question, 671,009 (71.89%) responded to it correctly. On the other hand, 258,331 (28.68%) failed to respond correctly by choosing the distractors A, B, C and E as summarised in Figure 9.

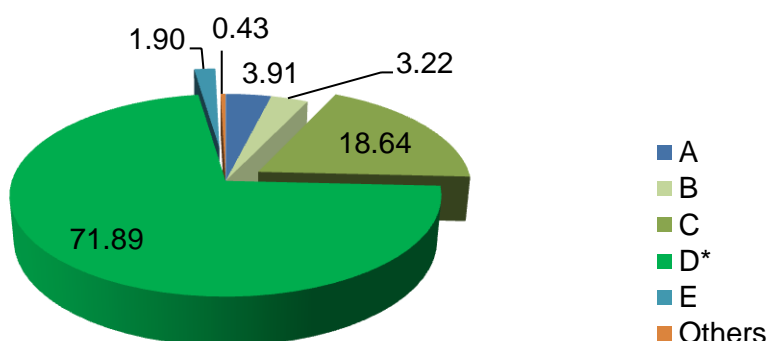


Figure 9: Candidates' Performance in Question 21

Statistics in Figure 9 show that most of the candidates managed to respond correctly to this question. These candidates had enough knowledge of the concept of AIDS. They were aware that AIDS is an

abbreviation of the words Acquired Immuno-Deficiency Syndrome. Therefore, they managed to recognise that option D, *defficiency of body immunity* is the correct response.

On the other hand, a few candidates who failed to respond correctly to the question had inadequate knowledge about the concept of AIDS. They failed to realise that AIDS is due to deficiency of body immunity. For example, those who chose incorrect option A, *loss of body immunity* and C, *absence of body immunity* did not know that if the body lacks immunity, it will be easily attacked by diseases and the person will die. Those who chose B, *high body immunity* and E, *ability of body immunity* were unaware of the concept of AIDS.

Question 22: An AIDS victim is **not** advised

- A to use drugs as instructed by the experts
- B to have lovers who have tested their blood
- C to accept him/herself and adhere to advices from experts
- D to take care of him/herself and live with hope
- E to eat balanced diet and examine health frequently.

This question assessed candidates' understanding of how to protect the HIV/AIDS victim from new HIV infections. Performance of the candidates in this question was average since out of 927,227 (99.35%) candidates who attempted this question 550,829 (59.02%) responded to it correctly. However, 258,398 (40.33%) candidates failed to respond correctly to it by choosing among the distractors A, C, D and E. The summary of percentage of candidates in each option is presented in Figure 10.

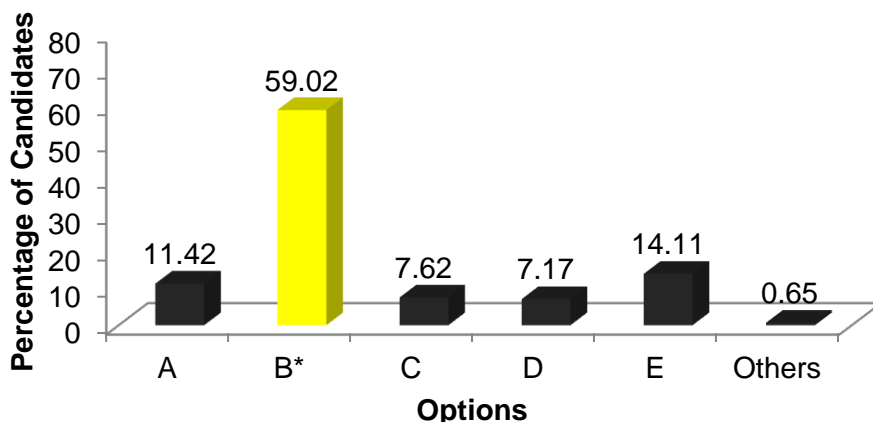


Figure 10: Candidates' Performance in Question 22

The data in Figure 13 show that this question had an average performance since 59.02 per cent of the candidates chose the correct response B, *to have lovers who have tested their blood*. These candidates had adequate knowledge about protection of HIV/AIDS victim against new HIV infection. They recognised that an AIDS victim is not advised to have lovers even if they have tested their blood.

Nevertheless, 40.33 per cent of candidates who opted for distractors A, C, D and E were unaware of protection of the HIV/AIDS victims against new HIV infection. They were unable to recognise that an AIDS victim is advised to use drugs as instructed by the experts, accept oneself and adhere to advice given from experts, take care of oneself and live with hope and eat balanced diet and examine health frequently.

Question 23: Why does AIDS victim live uncomfortably and lose hope?

- A Fear of being isolated by the family
- B Fear of being stigmatised by the society
- C Because of unknown fear
- D Because of shortage of food
- E Because of absence of drugs.

The question measured candidates' understanding of psychological effects of AIDS. The performance of the candidates in this question was average since out of 926,887 (99.31%) candidates who attempted this question, 464,508 (49.78%) responded to it correctly. The rest of the candidates, 462,379 (49.54%) failed to respond correctly to this question. Table 13 shows the number and percentage of candidates in each option.

Table 13: Number and percentage of candidates' choice in each option

Options	A	B*	C	D	E	Others
No. of Candidates	199,262	464,508	80,405	40,947	141,765	6,436
% of Candidates	21.35	49.78	8.62	4.38	15.18	0.68

Table 13 shows that about half of the candidates (49.78%) were able to choose the correct response B, *fear of being stigmatised by the society*. These candidates understood that stigmatisation from the society increases fear and loss of hope to AIDS victim.

On the other hand, 49.54 per cent of the candidates who failed to choose the correct response to this question did not know the psychological effects of HIV/AIDS to the victims. For example, 21.35 per cent who chose distractor A, *fear of being isolated by the family* did not know that AIDS victims do fear stigmatization from the society and not from family members. Similarly, 15.18 per cent who chose distractor E, *because of absence of drugs* did not know that drugs are no longer a threat to AIDS victims as the government supplies antiretroviral for free. Likewise, 8.62 per cent who chose distractor C, *because of unknown fear* and 4.4 per cent who chose distractor D, *because of shortage of food*, lacked knowledge on the fear that the AIDS victim encounters.

Question 24: What is the name of water that contains mineral salt?

- A Hard water.
- B Soft water.
- C Normal water.
- D Rock water.
- E Condensed water.

The question measured candidates' understanding of the properties of water. The overall performance of the candidates in this question was good as out of 928,522 (99.49%) candidates who attempted this question, 681,599 (73.03%) opted for the correct response. On the other hand, 246,923 (26.46%) of the candidates did fail. The performance in this question is summarized in Figure 11.

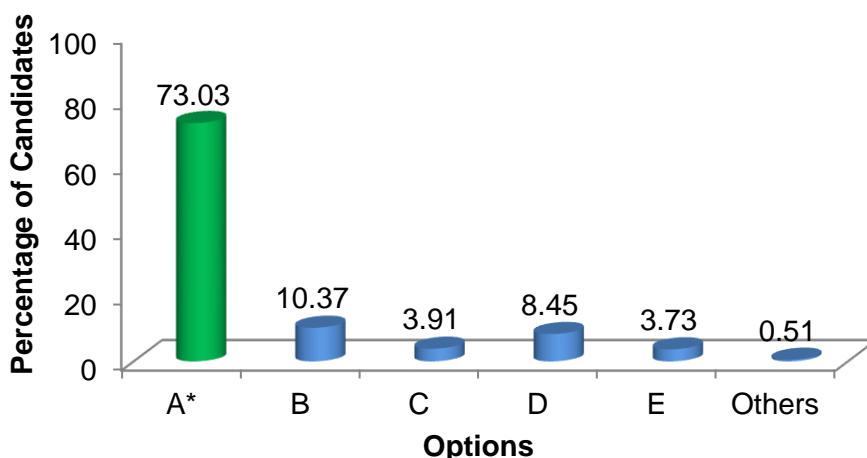


Figure 11: Candidates' Performance in Question 24

Figure 11 shows that about three quarters of candidates (73.03%) managed to choose the correct response A, *hard water*. These candidates had adequate knowledge about properties of water, hence understood that one of the properties of hard water is presence of mineral salts.

On the other hand, 26.46 per cent of the candidates who opted for incorrect responses B, C, D, and E were unaware of the concept of hard water. They failed to recognize that presence of mineral salts is the property of hard water. For example, those who chose distractor B, *soft water* did not know that soft water does not contain mineral

salts. Furthermore, those who chose distractors C, *normal water*, D, *rock water* and E, *condensed water* are unaware of the two classes of water (hard and soft water) and its properties.

Question 25: An example of an element is

- A Water.
- B Salt.
- C Hydrogen.
- D Sugar.
- E Carbon dioxide.

The question assessed candidates' understanding of the concept of element in the topic of matter. Out of 926,485 (99.27%) candidates who attempted the question, 463,506 (49.66%) responded to it correctly and 462,979 (49.61%) failed. Generally, the performance of the candidates in this question was average as summarized in Figure 12.

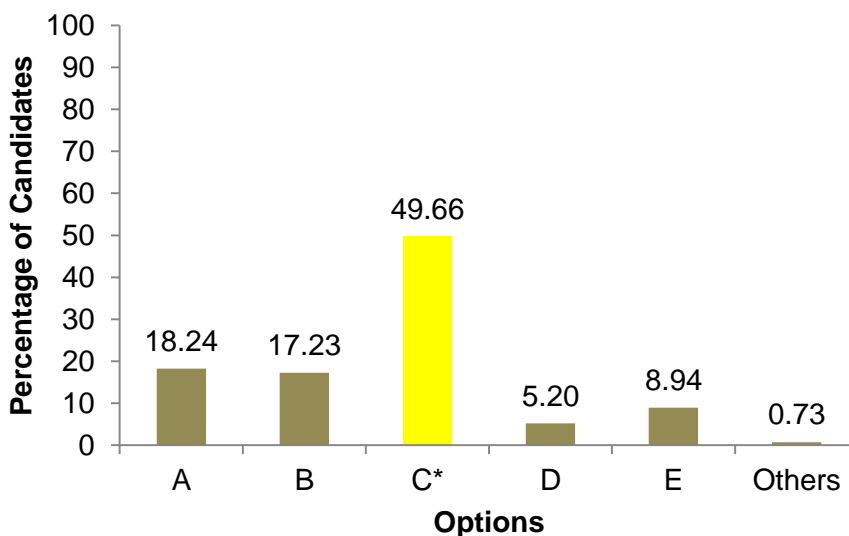


Figure 12: Candidates' Performance in Question 25

Statistics in Figure 12 show an average performance on this question since 49.66 per cent of the candidates chose the correct response C, *hydrogen*. These candidates were aware that an element is a simple substance made entirely from one type of

atoms. They understood that hydrogen is made of atoms of hydrogen only and thus it is an example of the element.

The candidates who opted for incorrect responses were not aware of the concept and examples of elements. They failed to recognise that A, *water*, B, *salt*, D, *sugar* and E, *carbon dioxide* are compound and not elements.

Question 26: The short form of a balanced chemical equation is represented by

- A Symbols and formula
- B Molecules, words and symbols
- C Molecules, words and formula
- D Sentences, words and formula
- E Words, radicals and ions.

The question intended to measure candidates' understanding of short form in representing a balanced chemical equation. A total of 926,099 (99.23%) candidates attempted this question out of which 551,458 (59.09%) responded to it correctly and 374,641 (40.13%) did not. Generally the performance of the candidates in this question is average as shown in Table 14.

Table 14: Number and percentage of candidates' choice in each option

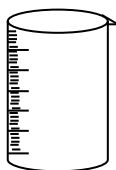
Options	A*	B	C	D	E	Others
No. of Candidates	551,458	152,593	109,150	64,234	48,664	7,224
% of Candidates	59.09	16.35	11.69	6.88	5.21	0.77

The candidates who chose the correct response had enough understanding on how to write a balanced chemical equation in short form. They knew that the short form of a balanced chemical equation is represented by symbols and formulas. Therefore, they were able to identify that the correct response is A, *symbols and formula*.

On the other hand, the candidates who opted for incorrect responses B, C, D and E had inadequate knowledge on how to write the short form of a balanced chemical equation. For example, those

who chose distractor B, *molecules, words and symbols* and C, *molecules words and formula* did not know that molecules and words are not used on representing short form of a balanced chemical equation. The candidates who chose distractor D, *sentences, words and formula* did not know that sentences and words are used to write chemical equation in words and not in short form.

Question 27: Figure No. 1 shows an apparatus which is used in the laboratory.



Which is the function of the apparatus shown in Figure No.1?

- A To measure density.
- B To measure weight.
- C To measure volume.
- D To measure area.
- E To measure length.

The question assessed the candidates' ability to identify the function of the given laboratory apparatus. A total of 958,286 (99.44%) candidates attempted this question, out of which 678,537 (72.70%) responded to correctly and 279,749 (26.74%) failed. The summary of candidates' performance in this question is as shown in Figure 13.

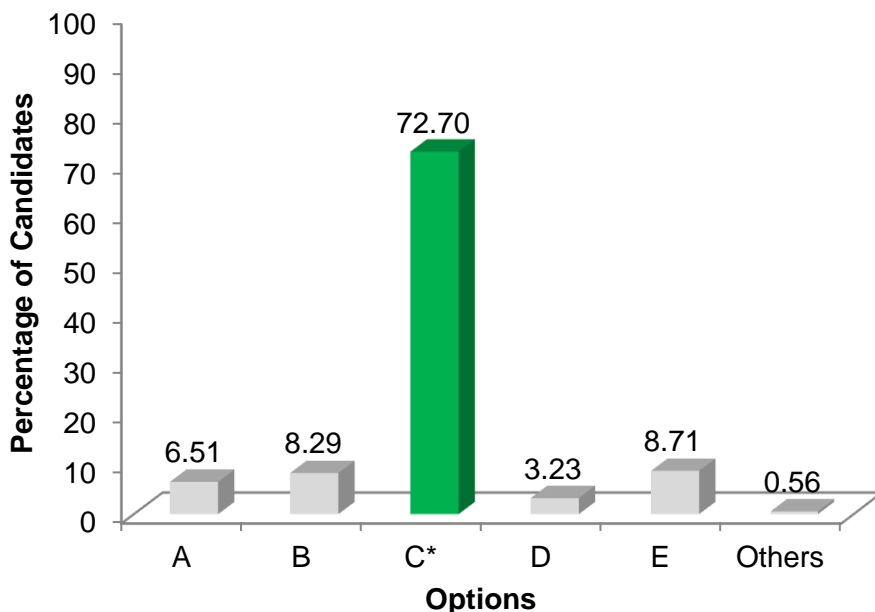


Figure 13: Candidates' Performance in Question 27

Generally, most of the candidates (72.70%) managed to choose correct responses as they were able to recognize that the apparatus given is beaker, and its function is to measure volume of liquids in the laboratory.

A few candidates (26.74%) who failed to respond correctly to this question failed to identify the given apparatus and its functions. They did not know that density is measured by a hydrometer, weight by a spring balance, area and length by a ruler.

Question 28: When does the liquid change into gas?

- A Temperature is decreased.
- B Temperature is increased.
- C Pressure is increased.
- D Pressure is decrease.
- E Friction is decreased.

The question assessed the candidates' understanding of changes of matter. The question was attempted by 927,291 (99.35%)

candidates. Generally, this was a good performance as seen in Figure 14.

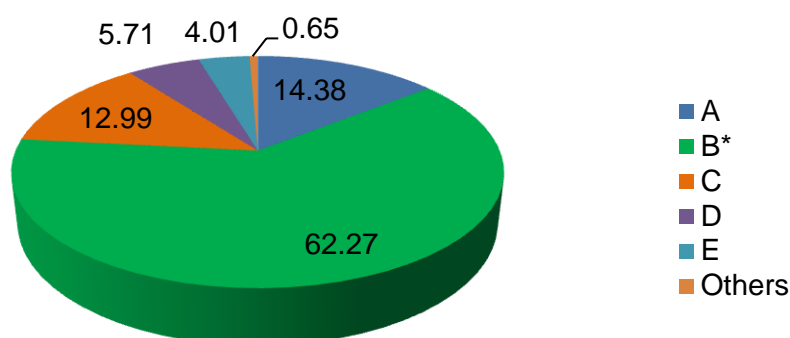


Figure 14: Candidates' Performance in Question 28

The data in Figure 14 shows that about two thirds (62.27%) of the candidates responded to correctly to the question. These candidates had enough understanding of the changes of states of matter particularly a change from liquid to gas. They knew that when temperature increases, liquid turns into gas through evaporation process. Hence they were able to identify that option B, *temperature is increased* was the correct response.

The rest of the candidates (37.08%) failed to respond correctly to this question since they chose the distractors A, C, D and E. These candidates had inadequate understanding of changes of matter. They failed to realise that when temperature increases, liquid changes into gas. Some chose the distractor A, *temperature is decreased* indicating that they lacked knowledge of changes of states of matter since when temperature decreases, liquid changes to solid not gas. Moreover, an increase or decrease in pressure and occurrence of friction do not change the states of matter.

Question 29: In how many states can matter exist?

- A Two
- B Three
- C Four
- D Five
- E Six

The question assessed the candidates' understanding of states of matter. The performance of the candidates in this question was good as out of 929,586 (99.60%) candidates who attempted this question, 716,324 (76.75%) responded to it correctly and 213,262 (22.85%) failed. Figure 15 summarizes the performance.

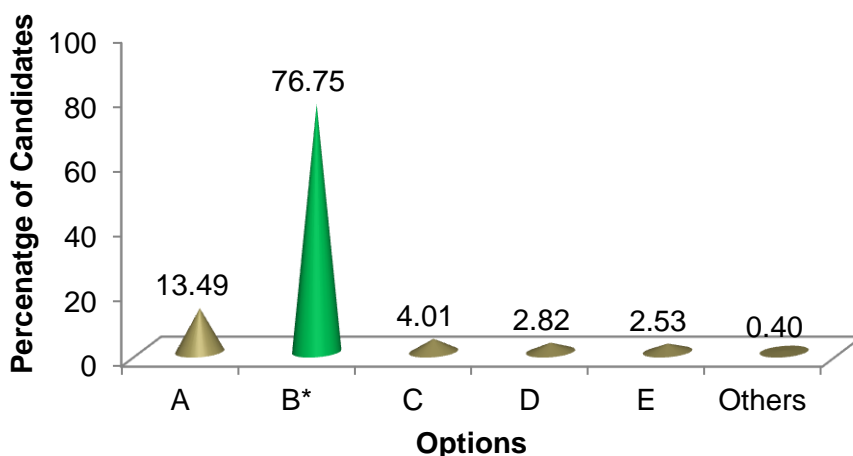


Figure 15: Candidates' Performance in Question 29

Generally, most of the candidates (76.75%) managed to respond to the question correctly. These candidates understood that matter occurs into three states which are solid, liquid and gas.

A few candidates (22.85%) who failed to give a correct response had inadequate understanding of the states of matter. They failed to recognise that option B, *three* was the correct response. They chose the incorrect responses A, *two*, C, *four*, D *five* and E, *six* indicating that they were unaware of the states of matter.

Question 30: In which class of lever is an axe placed?

- A First class
- B Second class
- C Third class
- D Fourth class
- E Fifth class

The question assessed the candidates' understanding of types of machine belonging to each class of the levers. The question was attempted by 925,190 (99.13%) candidates, out of which 297,238

(31.85%) responded to it correctly while 627,952 (68.15%) failed. This signifies poor performance in this question. The summary of candidates' performance in this question is presented in Table 15.

Table 15: Number and percentage of candidates' choice in each option

Options	A	B	C*	D	E	Others
No. of Candidates	320,853	244,358	297,238	30,179	32,562	8,133
% of Candidates	34.38	26.18	31.85	3.23	3.49	0.87

Data in Table 15 show that 68.15 per cent of the candidates failed to respond correctly to this question. These candidates failed to identify the class of the lever to which an axe belongs. They failed to understand that an axe belongs to the third class of the levers as it has the load in between the fulcrum and effort. This contributed to poor performance in this question.

However, one third (31.85%) of the candidates who responded to well to this question by choosing letter C, *third class* were aware of the machine that belong to each class of the lever. They also understood the characteristics of each class, a knowledge which helped them to identify that an axe has a fulcrum-load-effort arrangement.

Question 31: The source of all energy on the earth is

- A Stars
- B Oil
- C Moon
- D Wind
- E Sun

The question measured the candidates' ability to identify the major source of almost all energy on the earth. A total of 816,657 (87.50%) responded to correctly to the question, making it a good performed question. However, a few candidates, 111,202 (11.91%) did not choose the correct response. The candidates' performance in the question is shown in Figure 16.

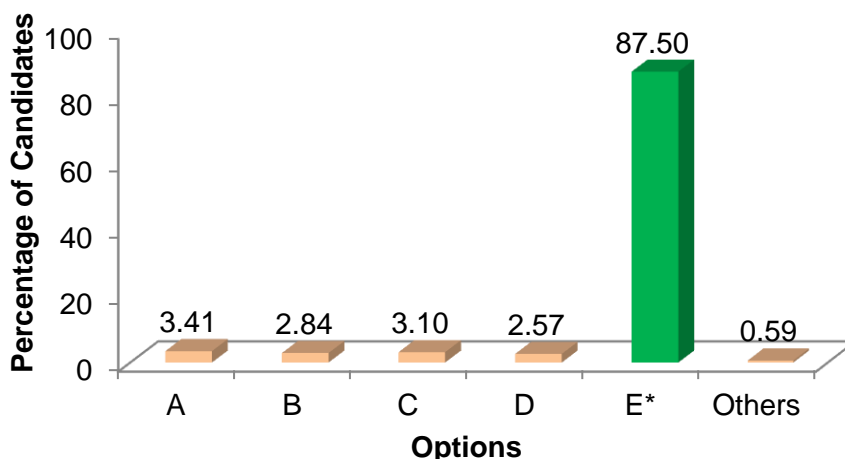


Figure 16: Candidates' Performance in Question 31

Most of the candidates were able to choose the correct response E, *sun* because they knew that the sun is the source of all energy on the earth. They were aware that from the sun we get heat energy, electric energy through photovoltaic cells and chemical energy that is packed in plants, produced during photosynthesis. In addition, the sun heats the earth. As a result, it causes movement of air and thus we get wind energy.

The candidates who failed to respond correctly to this question were unaware of the main source of all energy on the earth. They did not realise that stars, moon, oil and wind produce variety of energies but are not the source of all energy on earth. Some of them depend on the presence of the sun to produce their energy. For example, the moon reflects sunlight to produce light during the night and wind movement depends on heat from the sun. In addition, oil is not a renewable source of energy thus cannot serve as a main source of all energy on earth.

Question 32: Which of these is **not** a source of electricity?

- A Battery
- B Dry cell
- C Bulb
- D Generator
- E Magnet

The question assessed the candidates' understanding about the sources of electric energy. The overall performance of the candidates in this question was average as 404,549 (43.35%) candidates chose the correct response. The rest, that is 523,107 (56.04%) of the candidates failed. The performance in this question is summarised in Table 16.

Table 16: Number and percentage of candidates' choice in each option

Options	A	B	C*	D	E	Others
No. of Candidates	36,102	119,081	404,549	73,531	294,393	5,667
% of Candidates	3.87	12.76	43.35	7.88	31.54	0.61

The data presented in Table 16 shows that 43.35 percent of the candidates managed to choose the correct response C, *bulb*. These candidates had enough understanding about the source of electricity. They managed to identify that the bulb is not a source of electricity but an electric appliance. The bulb uses electricity to produce light energy.

On the other hand, 56.04 per cent of the candidates failed to respond correctly to the question as they chose among the distractors A, *battery*, B, *dry cell*, D, *generator* and E, *magnet*. These candidates were not aware that the battery, dry cells, generator and magnet are sources of electricity.

Question 33: An electric current of 1.5 Amperes passed through a wire with a resistance of 30 ohms. The amount of that electric energy is

- A 35 V
- B 45 V
- C 15 V
- D 2 V
- E 450 V

This question assessed the candidates' ability to use Ohm's law to calculate the amount of electric energy passing through the wire. A

total of 439,741 (47.12%) candidates responded to correctly to the question while 485,790 (52.05%) did not. Generally, the performance of the candidates in this question was average as statistics in Table 17 show.

Table 17: Number and percentage of candidates' choice in each option

Options	A	B*	C	D	E	Others
Number of Candidates	53,513	439,741	102,999	185,809	143,469	7,792
% of Candidates	5.73	47.12	11.04	19.91	15.37	0.83

The statistics in Table 17 show that 47.12 per cent of the candidates managed to choose the correct response B, 45 V. Those candidates knew the Ohm's law ($V = IR$) where V represents the amount of energy in voltage, R resistance and I current. They also managed to calculate the amount of electric energy by multiplying 1.5 Ampere with 30 Ohms and obtain an electric energy of 45 V.

On the other hand, 52.05 per cent of the candidates failed to respond to this question correctly as they failed to use Ohm's law to calculate electrical energy. They did not know that electric energy is obtained by multiplying the current measured in Amperes and the resistance in Ohms. However, some candidates misconceived the Ohm's law with other concepts. For example, those who opted for distractor D, 2 V divided resistance of 30 ohms by current of 1.5 Amperes. In addition, others lacked mathematical manipulation ability, particularly in multiplying decimals.

Question 34: The energy we use when lifting loads using a lever is called

- A Force
- B Energy
- C Effort
- D Fulcrum
- E Newton

The questions assessed the candidates' understanding of a simple machine specifically the lever. The performance of candidates in this question was poor since more than a half, 556,402 (59.62%) of the candidates failed to choose the correct response while only 370,825 (39.73%) candidates managed to choose the correct response. Table 18 shows the summary of candidates' performance statistics.

Table 18: Number and percentage of candidates' choice in each option

Options	A	B	C*	D	E	Others
No. of Candidates	321,704	76,430	370,825	68,942	89,326	6,096
% of Candidates	34.47	8.19	39.73	7.39	9.57	0.65

The statistics in Table 18 show that most of the candidates (59.62%) failed to choose the correct response to this question. Out of them, 34.47 per cent chose distractor A, *force* since they did not know that force is a pull or push while *effort*, which is the correct answer, is the force applied to the machine for it to work. In addition, those who chose B, *energy*, were not aware that energy is the ability to lift a load and not the effort used in lifting it. The candidates who chose distractor D, *fulcrum* lacked knowledge that the fulcrum is a pivot/turning point of the lever. Moreover, those who chose distractor E, *Newton* could not understand that newton is a unit of force and effort.

However, a few candidates (39.73%) managed to choose the correct response, C *effort*. These candidates understood that effort is the energy applied to the machine for it to work (lift loads). They also knew parts of the lever which are load, fulcrum and effort.

Question 35: Which are the two types of machines?

- A Big and small.
- B Heavy and light.
- C Natural and modern.
- D Hard and soft.
- E Simple and complex.

The questions assessed the candidates' understanding of types of machines. Most of the candidates 801,453 (85.87%) managed to respond correctly while a few of them, 126,428 (13.55%) did not. The candidates' performance in this question is shown in Figure 17.

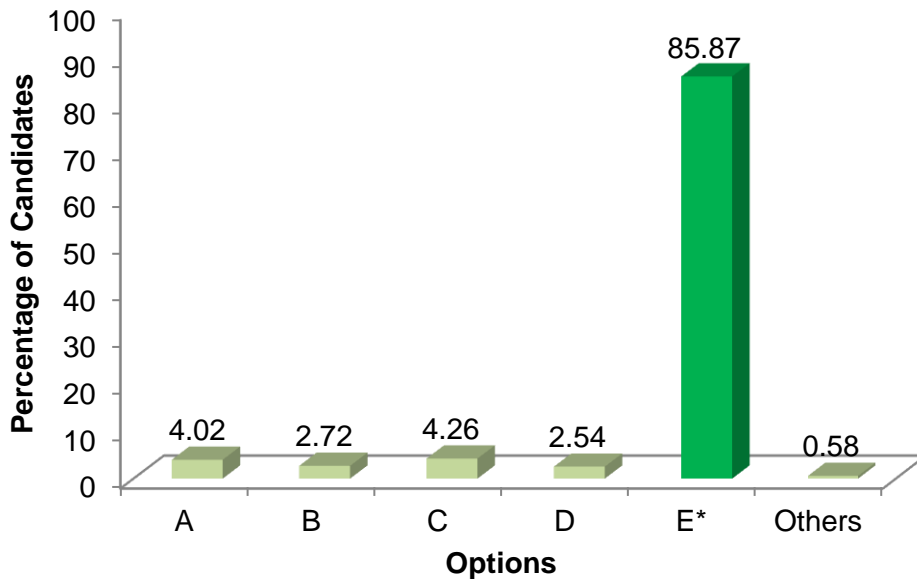


Figure 17: Candidates' Performance in Question 35

The statistics in Figure 18 show that most of the candidates (85.87%) managed to choose the correct response E, *simple and complex*. These candidates had enough knowledge of types of machine which enabled them to identify the two types of machines.

A few candidates (13.55%) who opted for incorrect responses A, *big and small*, B, *heavy and light* C, *natural and modern* and D, *hard and soft* did not know that the classification of machines is based on its function and complexity and not otherwise.

- Question 36:** When looking in front of a road, you can see something which resembles a pool of water crossing the road. What is the cause of this situation?
- A Reflection of light rays
 - B Refraction of light rays.
 - C Crossing of light rays.
 - D Absorption of light rays
 - E Penetration of light rays

The questions intended to assess the candidates' understanding on the properties of light when passing through different media. Only 244,477 (26.19%) candidates were able to choose the correct response B, *refraction of light rays* while 680,350 (72.9%) failed. This question was poorly performed by most of the candidates compared to the other questions. Table 19 shows the candidates' performance.

Table 19: Number and percentage of candidates' choice in each option

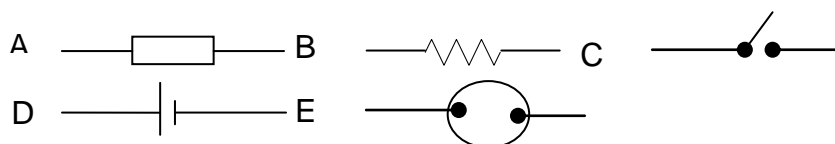
Options	A	B*	C	D	E	Others
No. of Candidates	410,650	244,477	67,494	148,396	53,810	8,496
% of Candidates	43.99	26.19	7.23	15.9	5.77	0.91

As data in Table 18 show most of the candidates (72.9%) failed to respond correctly to this question. They chose incorrect responses A, C, D and E. These candidates had inadequate understanding of the properties of light in different media. They failed to recognise that when light passes through media of different density it bends. For example, those who opted for the distractor A, *reflection of light rays* did not understand that reflection occurs when light strikes on smooth and shine objects. In addition, those who chose distractor D, *absorption of light rays* could not understand that absorbed light cannot be seen.

A few candidates (26.19%) who chose the correct response had knowledge of properties of light in different media. They were able to recognize that when light travels through the road during sunny day,

refraction occurs. This is due to difference in temperature of the air above the road, which causes changes in density of air and hence light refraction.

Question 37: Which symbol represents dry cell in an electric circuit?



The question assessed the candidates' understanding of the symbols used in an electric circuit. A total of 504,754 (54.08%) candidates were able to respond correctly to the question while 422,394 (45.26%) candidate failed. Generally, the performance of the candidates in this question was average as shown in Figure 18.

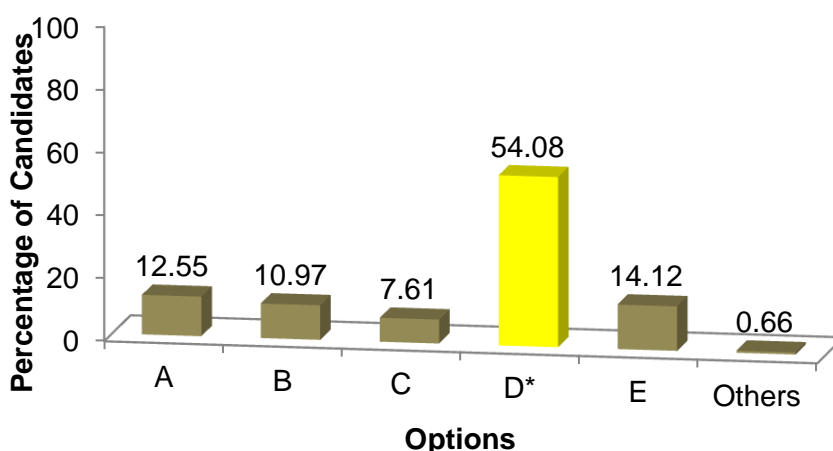


Figure 18: Candidates' Performance in Question 37

Statistics in Figure 18 show that the question had an average performance since 54.08 per cent of the candidates chose the correct response. These candidates were aware of various symbols used in an electrical circuit, specifically a symbol of a dry cell.

The rest of the candidates (45.26%) opted for incorrect options. These candidates were not aware of the symbols used in an electric circuit. For example, those who chose distractors A and B did not understand that both of these symbols represent a *resistor*. Also, the symbol in option C, represents a *switch* while E represents socket.

- Question 38:** An instrument used to observe objects in the atmosphere is called
- A Telescope
 - B Pin hole camera
 - C Periscope
 - D Microscope
 - E Concave lens.

The question assessed the candidates' understanding of an instrument used to observe distant objects. A total of 471,810 (50.55%) candidates responded to correctly to the question while 455,884 (48.85%) failed. This signifies an average performance. The summary of the number of candidates in each option is presented in Figure 19.

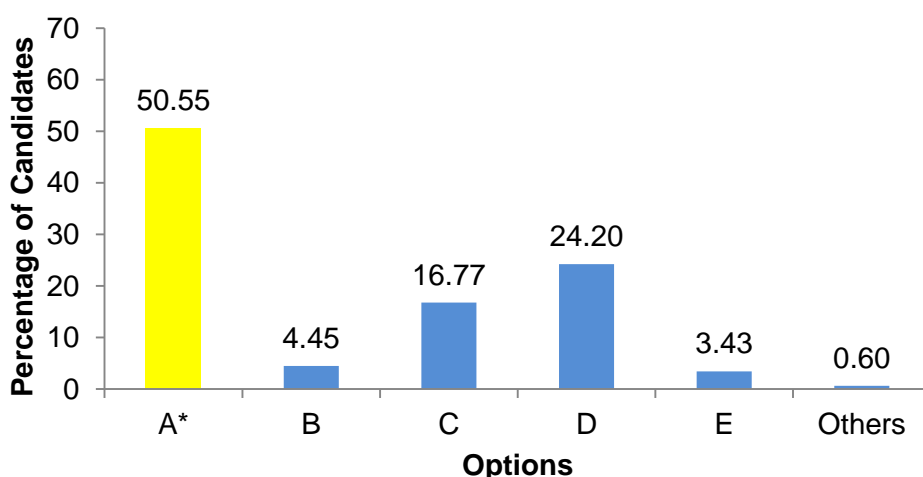


Figure 19: Candidates' Performance in Question 38

The statistics in Figure 20 show that 50.55 per cent of the candidates managed to respond correctly to this question. These candidates had adequate knowledge on the instrument used to observe distant objects and understood that telescope is used to observe objects in the atmosphere, hence chose A *telescope*

On the other hand, 48.85 per cent of the candidates failed to respond correctly to this question. These candidates had inadequate knowledge of the instrument used to observe things in the atmosphere. Most of the candidates (24.20%), were attracted by

option D, *microscope* since they did not know that a microscope is used to magnify objects which cannot be seen by naked eyes at a short distance. Moreover, those who chose options B, C and E were unaware that the instruments listed cannot observe objects in a distant place like in the atmosphere.

Question 39: A student dropped a stone in a bucket full of water and about 5000 cm³ of water spilled out. Which statement is correct about this scientific event?

- A The amount of water spilled out is the same as that remained in the bucket.
- B The volume of the stone is the same as that of the water spilled out.
- C Water is matter thus it is heavier than the stone.
- D The stone is not matter thus it is heavier than the water.
- E Both water and stone are matter thus have the same weight.

The question assessed the candidates' understanding of the principles of sinking and floating of objectives in water. A total of 524,464 (56.19%) candidates managed to respond correctly to the question while 404,010 (43.29%) failed. This signifies an average performance in this question. Figure 20 gives the summary of performance.

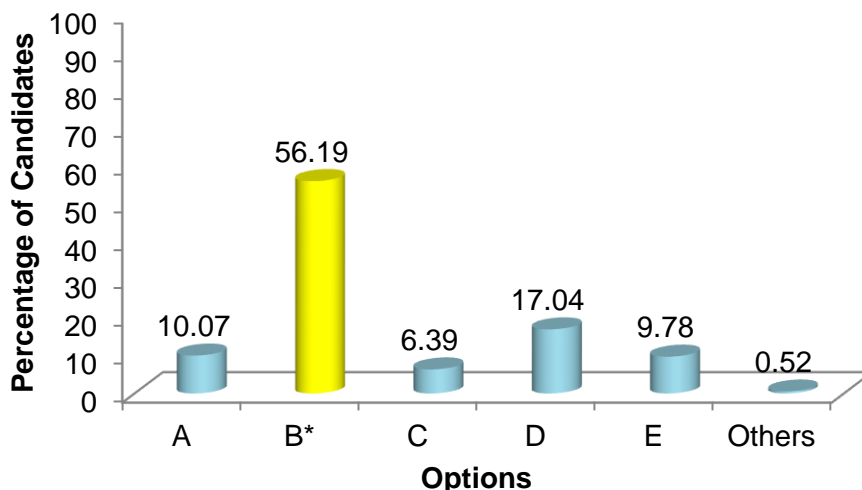


Figure 20: Candidates' Performance in Question 39

Data in Figure 21 show that this question had an average performance of 56.19 per cent. The candidates who were able to respond to this question correctly understood that when an object is immersed in a bucket full of water, the amount of water spilled out is equal to the volume of that object. Therefore, they were able to identify that option B, *the volume of the stone is the same as that of the water spilled out* is the correct response.

The rest of the candidates (43.29%) who failed to respond to the question correctly were unaware of the principles of sinking and floating of objects in water. They failed to realise that the amount of water spilled out is equal to the volume of the stone immersed. For example, those who chose distractor A, *the amount of water spilled out is the same as that remained in the bucket* did not understand that the amount of water displaced depends on the weight of the object immersed. Also, those who chose C, *water is matter thus it is heavier than the stone*, D, *the stone is not matter thus it is heavier than the water* and E, *both water and stone are matter thus have the same weight* lacked knowledge about the principles of sinking and floating of objects in water.

Question 40: Which series is correct about arrangement of the components of scientific investigation?

- A Questionnaire, apparatus, method, aim, conclusion and results.
- B Identify the problem, hypothesis, questionnaire, apparatus, results and conclusion.
- C Questionnaire, identify the problem, apparatus, results and conclusion.
- D Aim, identify the problem, apparatus, results and conclusion.
- E Aim, hypothesis, apparatus, methods, results and conclusion.

The question assessed the candidates' ability in identifying the correct series of the components of scientific investigation. A total of 927,648 (99.39%) candidates responded to this question, out of which 279,579 (29.96%) responded to correctly. Most of the candidates, 648,069 (69.44%) failed to choose the correct response, instead, they chose distractors as shown in Table 20.

Table 20: Number and percentage of candidates' choices in each option

Option	A	B*	C	D	E	Others
No. of Candidates	76,557	279,579	77,820	159,367	334,325	5,675
% of Candidates	8.20	29.96	8.34	17.08	35.82	0.61

The statistics in Table 20 show that most of the candidates (69.44%) failed to respond correctly to the question. These candidates did not know the correct series of the components of scientific investigation. They failed to realise that option B, *identify the problem, hypothesis formulation, questionnaire, apparatus, results and conclusion* is the correct response. For example, most of them (35.82%) chose the distractor E, *aim, hypothesis, apparatus, methods, results and conclusion* since they did not know that those are not the correct series of steps to follow in doing scientific investigation. They failed to realise that in doing any scientific investigation, one must start with identifying the problem and not setting the aim of investigation.

However, a few candidates (29.96%) who responded to correctly to the question had adequate knowledge of scientific investigation and thus managed to identify the correct series of components of scientific investigation. These candidates knew that in doing scientific investigation we start with identification of the problem, hypothesis formulation and preparation of tools for conducting investigation such as questionnaire and apparatus, results and finally conclusion.

2.2 Section B: Short Response Questions

Question 41: (a) State two principles of a magnet.

(b) What actions cause demagnetisation of the magnet? Mention two.

The question assessed the candidates' understanding of the concept of magnetic energy. The performance of candidates was poor as only one third (30.74%) did well. The rest, (69.26%) failed to write the correct responses. Figure 21 summarises the pefomance in the question.

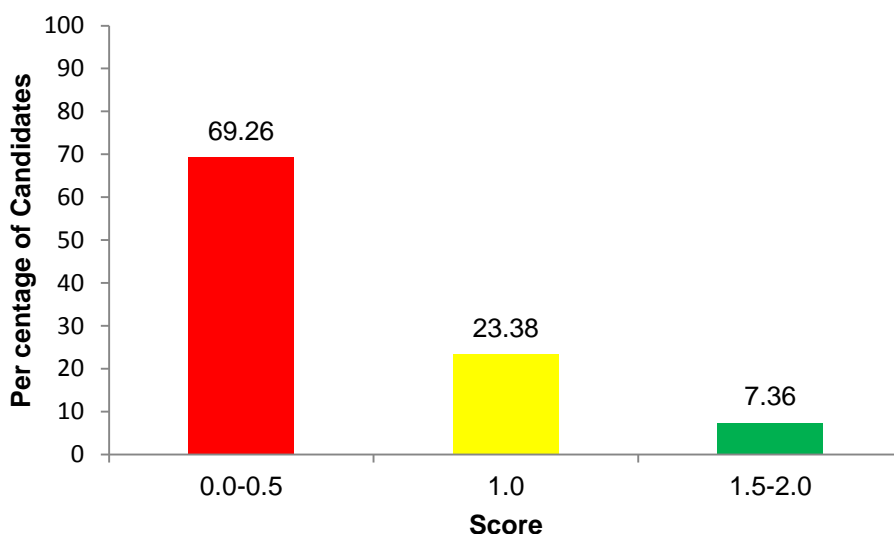


Figure 21: Candidates' Performance in Question 41

Analysis of the candidates' responses shows that most of those who failed had inadequate knowledge on magnetic energy, thus they wrote responses which did not reflect the demand of the

question. For example, in part (a), some of the candidates wrote short responses like *attraction and repulsion or repel, attract, attracts each other, repel each other*. These responses were not correct since they lacked essential key words “like pole” and “unlike poles” which are important in explaining the properties of magnet. Others showed misconception with the task of the question as they gave uses of magnet instead of principles. For example, one of the candidates wrote: *used to lift heavy loads and to separate sand and iron*. Another candidate wrote *it may be used to make electricity and to make compass direction*. Others interchanged the responses for part (a) and (b). In part (b), some of the candidates wrote irrelevant responses. For example, one of the candidates misconceived the concept of magnet and rusting of iron, thus gave responses which related to the ways to protect iron from rusting by writing *oiling*. Similar example of such responses is shown in Extract 1.1.

41.	(a)	State two principles of magnet.
	(i)	<u>it used in electricity</u>
	(ii)	<u>it used in speaker</u>
	(b)	What actions cause demagnetisation of the magnet? Mention two.
	(i)	<u>By mixing iron filings</u>
	(ii)	<u>and sand.</u>

Extract 1.1: A sample of the candidate's poor response in question 41.

On the other hand, the analysis shows that although the question was not well performed, some of the candidates were able to respond to all the parts of the question correctly. Those candidates had enough understanding of different properties of magnets. An example of such correct responses is shown in Extract 1.2.

41.	(a)	State two principles of magnet.
	(i)	<u>Like poles repel</u>
	(ii)	<u>Unlike poles attract</u>
	(b)	What actions cause demagnetisation of the magnet? Mention two.
	(i)	<u>Hammering</u>
	(ii)	<u>Heating</u>

Extract 1.2: A sample of correct response in question 41.

Question 42: Pazi was ironing, his hand touched hot iron and he removed it quickly from the iron. That is an example of what action?

The question measured knowledge of the candidates's in identifying voluntary and involuntary actions. The performance of the candidates was poor as 82.72 per cent failed, while only 17.08 per cent passed. Figure 22 summarises the performance.

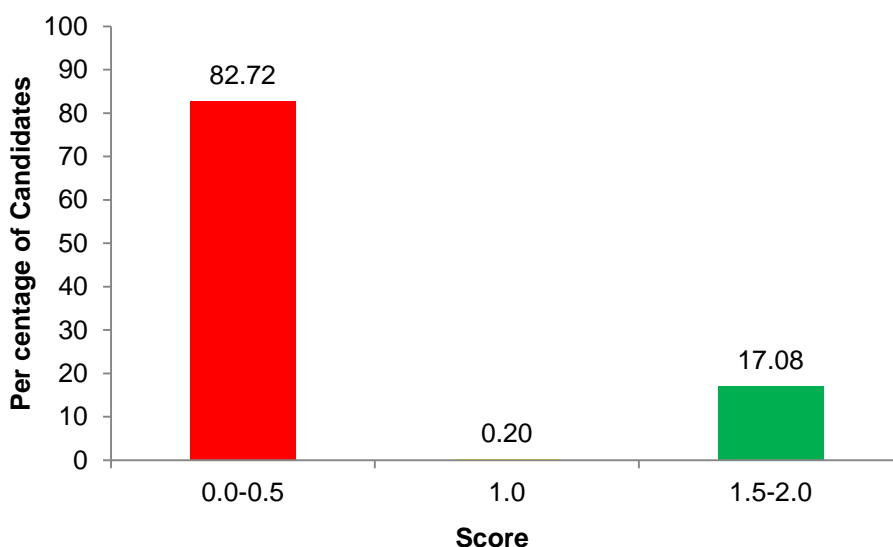


Figure 22: Candidates' Performance in Question 42

The analysis of candidates' responses shows that the candidates with poor performance had low understanding of the nervous system, specifically voluntary and involuntary actions. For example, one candidate wrote *is an action of serving life*, another one wrote *is an action of removing the hand*; while another candidate wrote *is an action of pain*. Moreover, some of the candidates misconceived the concept of nervous system with that of changes of matter. For example, one candidate wrote: *is a chemical reaction*. Yet another candidate gave the responses based on the properties of the iron relative to heat conduction by writing *conduction (method of heat transfer)*. Extract 2.1 is used as an example.

42. When Pazi was ironing, his hand touched hot iron and he removed it quickly from the iron. That is an example of what action?

that iron is a good conductor of heat

Extract 2.1: Sample of a poor response from the candidate

Further analysis of the candidates' responses shows that the candidates with higher performance had enough knowledge on differentiating voluntary and involuntary actions. Thus, they managed to give correct responses. A sample of a correct response is given in Extract 2.2.

42. When Pazi was ironing, his hand touched hot iron and he removed it quickly from the iron. That is an example of what action?

Reflex action

Extract 2.2: Sample of a good response from the candidate.

Question 43: What advantage do bacteria present in plants of leguminous family have in the soil?

The question measured the candidates' understanding of the importance of bacteria found in the roots of leguminous plants in the soil. The question was well performed as 60.98 per cent of the candidates scored 40 per cent of marks and above. Figure 23 shows the percentage of candidates per score.

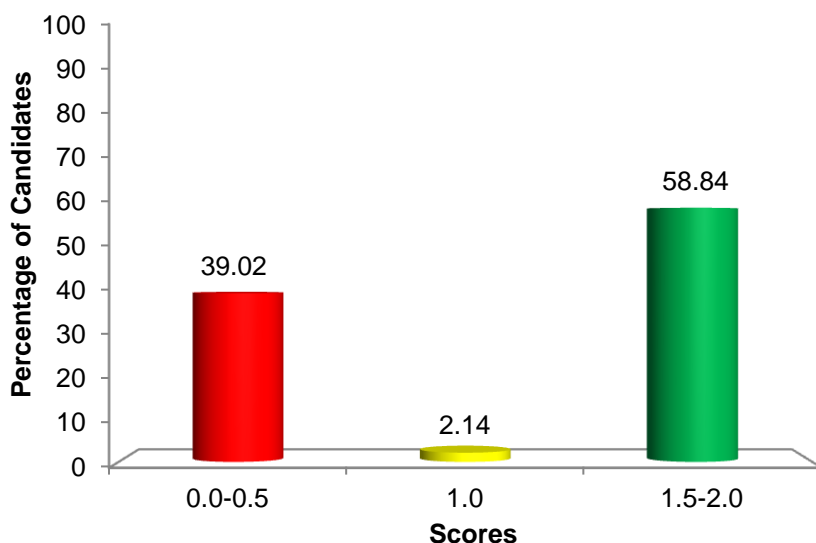


Figure 23: Candidates' Performance in Question 43.

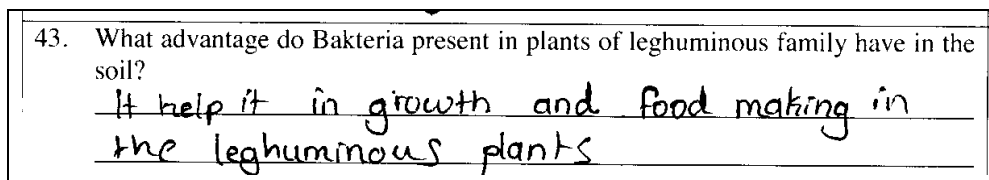
The analysis of candidates' responses showed that the candidates who performed well in this question managed to write correct responses like *to increase soil fertility/nitrogen in the soil*. These candidates understood the role of leguminous plants in fertilizing the soil. They also knew about the existing relationship between leguminous plants and circulation of nitrogen gas in the soil. Another example of correct responses is given in Extract 3.1.

43. What advantage do Bakteria present in plants of leguminous family have in the soil?
The advatage is the Bakteria convert atmospheric nitrogen into nitrate

Extract 3.1 Sample of a correct response from the candidate.

The candidates who failed to give correct responses had no understanding on the role of the bacteria living in the roots of leguminous plants. For example, one of the candidates wrote *because they have nitrogen gas, they add protein in the soil and they help in pollination*. The latter response shows that the candidate was not aware that the agents of pollination are insects and not bacteria. Other responses were: *to simplify work, causes diseases to vegetable* and *to absorb water*. Those candidates misconceived the

tested concept with other scientific concepts. An example of incorrect response is shown in Extract 3.2.



Extract 3.2: Sample of poor responses from the candidate.

Question 44: (a) What is the main function of the heart?

(b) Identify two functions of blood in the animal's body.

The question assessed the candidates' understanding of the role of transportation system in animal's body. The performance in this question was good as 75.26 per cent responded to correctly while the 24.74 per cent failed. Figure 24 shows the scores data in this question.

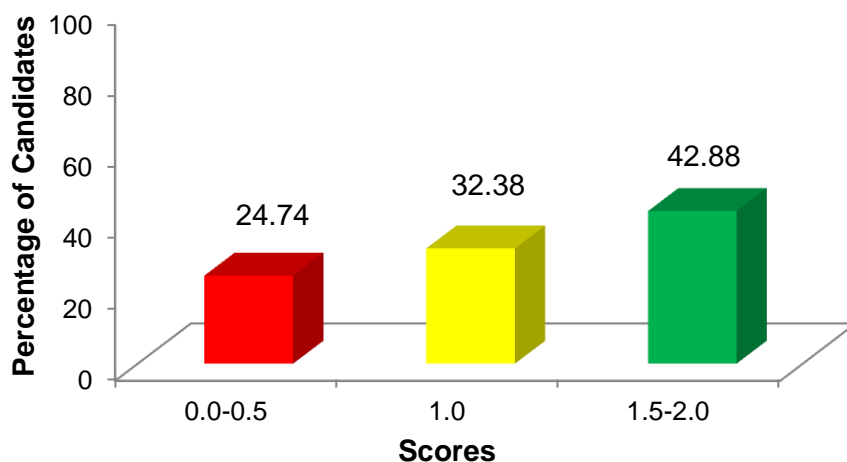


Figure 24: Candidates' Performance in Question 44

The analysis of the candidates' responses showed that the candidates who scored high marks managed to state the function of the heart and blood effectively. The responses provided by those candidates in part (a) was *the function of the heart is to pump blood*

and in part (b) the *function of blood is to transport food and air (oxygen and carbondioxide)*. Extract 4.1 shows a sample of the candidates' correct responses.

44. (a) What is the main function of the heart? <u>The main function is to pump blood</u>
(b) Identify two functions of blood in the animal's body? (i) <u>To transport oxygen to the body parts</u> (ii) <u>To transport food and defending the body against disease</u>

Extract 4.1: Sample of correct response from the candidate.

The analysis of the candidates' responses shows that some of the candidates who provided incorrect responses had misconception between the function of the heart and other organs. For example, one of the candidates wrote in part (a) *the function of the heart is for transportation of food* of which is the function of the blood. Another candidate explained that *the heart assist in breathing* of which is the function of the lungs. In part (b) some of the candidates outlined the composition of the blood and its particles like *white blood* and *red blood cells* as the functions of the blood. One of the candidates wrote the response which was contrary to the concept of transportation system explaining that; *the function of the blood is to stimulate the body and strengthen the animal's body*. Further example of poor responses from the candidates is shown in Extract 4.2.

(b) Identify two functions of blood in the animal's body? (i) <u>to give energy to the body</u> (ii) <u>to give body cells that help us in life living</u>
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Extract 4.2: A sample of poor response from the candidate.

Question 45: The question had two parts:

- (a) Observe Figure 2 then answer the question that follow:

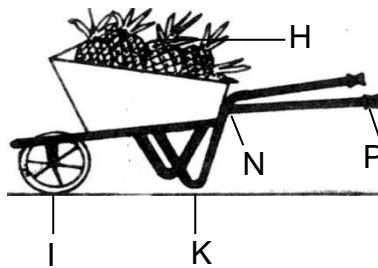


Figure No. 2

When the lever shown in Figure 2 is working, what is the name of the part labelled **P**?

- (b) Why is a hammer considered as a machine?

The question intended to assess the candidates' understanding of the concept of simple machines. The performance of the candidates' in this question was good as 84.46 per cent responded to correctly and thus scored from 1.0 to 2.0 marks. However, 15.54 per cent had poor performance. Figure 25 shows the distribution of candidates' marks in this question.

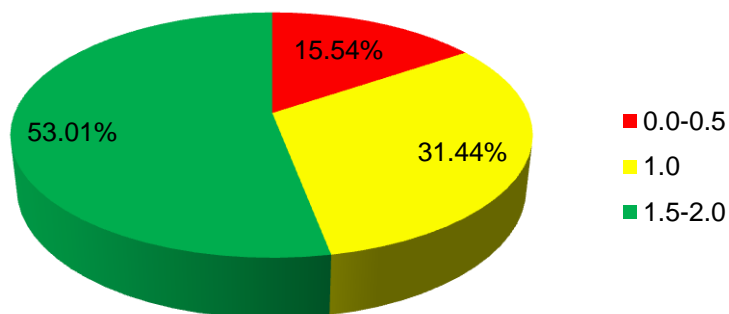


Figure 25: Candidates' Performance in Question 45

The analysis of candidates' responses showed that the candidates who got higher scores had enough knowledge of the lever as the simple machines. Such knowledge enabled them to answer both parts of the question correctly. In part (a), they knew that a lever has three parts: *fulcrum*, *load* and *effort*, and that letter P represents the *Effort*. In part (b), the candidates were able to give correct explanation in which some of them wrote that a hummer is a machine because it simplifies work. Others responded to by writing that *because it can be used to simplify work where mere hands can not*. A sample of correct response is shown in Extract 5.1

45. (a) Observe Figure 2 then answer the question that follows:

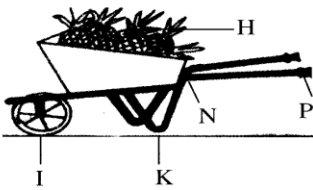


Figure No. 2

When the lever shown in Figure 2 is working, what is the name of the part labelled **P**?

The name of the part labelled p is Effort

(b) Why is a hummer considered as a machine?

Because it simplifies work

Extract 5.1: A sample of correct responses from the candidate.

Further analysis of the candidates' responses revealed that among those who scored low marks, some of them knew the three parts of the lever (fulcrum, load and effort), but failed to mention the part represented by letter P. In this aspect, some of the candidates responded to by writing *fulcrum* and *load* respectively, instead of *effort*. The analysis also indicated that some of the candidates did not understand the concept of lever; hence they wrote anything related to the picture. For example, one of the candidates wrote that letter P represents *a wheelbarrow* while others wrote *a wheelbarrow with pineaples*. These candidates failed to integrate the concept of a wheelbarrow as a simple machine (lever), which implies lack of

knowledge of parts of simple machines. In part (b), they failed to give reason why the hummer is considered a machine. Few of them gave responses in terms of classes of the lever like *a hummer is a machine because it carries large load, it is made up of two or more simple machines and it is used to hammer the nail*. More examples are given in Extract 5.2

45. (a) Observe Figure 2 then answer the question that follows:

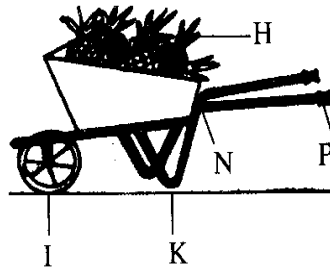


Figure No. 2

When the lever shown in Figure 2 is working, what is the name of the part labelled **P**?

force

- (b) Why is a hummer considered as a machine?

the body consist of many Parts
and can produs.

Extract 5.2: A sample of an incorrect response from the candidate.

3.0 ANALYSIS OF PERFORMANCE IN TOPICS

The science paper assessed 07 topics which are *Health Services and Methods of Preventing Diseases*, *First Aids*, *Living Things* and *Changes of Objects, States and Events*. Others are *Procedures in Science*, *Energy, Machine and Work*, and *HIV/AIDS*.

The statistics shows that three topics had high performance where the topic HIV/AIDS had the highest (69.97%), followed by *Changes of Objects, States and Events*, (65.58%) and *Health, Health Services and Methods of Preventing Diseases* (60.59%). The remaining topics which are *Procedures in Science*, *Living Things*, *First Aids* and *Energy, Machine and Work* had an average performance of 43.07%, 48.68%, 54.80% and 55.59% respectively.

Comparison of candidates' performance between 2018 and 2019 has shown an increase from 82.56 to 83.50 per cent, implying a rise of 0.94 per cent. There is also a rise in percentage for four topics as follows: *Procedures in Science* has raised for a difference of 18.77 per cent, *Changes of Objects, States and Events* for a difference of 16.68 per cent; *Energy, Machine and Work*, a difference of 8.59 per cent, and *Health, Health Services and Methods of Preventing Diseases* (4.19%). Despite such an increase, there was a fall in performance in 03 topics which are *Living Things* (11.42%), *First Aid* (9.30%) and *HIV/AIDS* (4.83%). The summary of performance statistics in each topic is presented in the **Appendix**.

4.0 CONCLUSION

The analysis of various data and the candidates' responses has shown that the general performance in PSLE 2019 Science subject was good. The performance has shown an improvement as compared to that of 2018. Such good performance was influenced by the good performance in the topics of *Changes of Objects, States and Events*, *Energy, Mashine and Work* and *Health, Health Services and Methods of Preventing Diseases*. The good performance in those topics was attributed to high performance in questions 31, 35, and 45 respectively.

5.0 RECOMMENDATIONS

In order to improve future candidates' performance in Science, the following are recommended:

- (a) Teachers should guide pupils to read examination instructions and understand the particular question, before responding it.
- (b) Teachers should give pupils exercises based on the use of arithmetics. This will enable the learners to be able to solve simple calculations, especially in the topic of *Energy, Machines and Work*.
- (c) Pupils should be guided to do various activities during teaching and learning of abstract concepts such as the topic of nervous system. The use of models and activity doing will enable the pupils to understand the respective topics.

APPENDIX

COMPARISON OF CANDIDATES' PERFORMANCE FOR EACH TOPIC IN 2019 AND 2018

S/N	Topic	PSLE 2019				PSLE 2018			
		Performance in each question		Average performance (%)	Remarks	Performance in each question		Average performance (%)	Remarks
		Question number	% performance			Question number	% performance		
1	HIV/AIDS	17	88.97	69.97	Good	28	79.7	74.80	Good
		18	76.75			29	68.1		
		21	71.89			30	76.7		
		22	59.02						
		23	49.77						
2	Changes of Objects, States and Events	24	73.03	65.58	Good	31	26.0	48.90	Average
		25	49.66			36	69.2		
		26	59.09			37	28.5		
		27	72.70			38	41.9		
		28	62.27			39	58.0		
		29	76.75			44	69.9		
3	Health, Health Services and Methods of Preventing Diseases	2	85.96	60.59	Good	1	22.4	56.40	Average
		3	64.16			12	88.8		
		8	79.07			16	69.0		
		10	51.99			20	19.4		
		11	40.47			21	48.9		
		12	59.97			22	77.0		
		13	62.64			23	47.9		
		14	47.34			24	58.8		
		15	61.45						
		16	81.45						
		42	17.28						
		44	75.26						
4	Energy, Mashines and Work	30	31.85	55.59	Average	7	56.2	47.00	Average
		31	87.50						
		32	43.35						
		33	47.12						
		34	39.73			17	60.6		
		35	85.87			18	62.2		
		36	26.19			25	35.9		
		37	54.08			32	23.4		
		38	50.55			33	38.2		
		41	60.79			40	50.8		
		45	84.46			45	48.8		
5	First Aid	19	36.19	54.80	average	25	35.9	64.10	average

S/N	Topic	PSLE 2019				PSLE 2018			
		Performance in each question		Average performance (%)	Remarks	Performance in each question		Average performance (%)	Remarks
		Question number	% performance			Question number	% performance		
6	Living Things	20	73.41	48.68	Average	26	84.8	60.10	Good
		1	84.44			27	71.7		
		4	33.99			2	66.6		
		9	27.62			3	44.9		
						4	61.4		
						5	65.0		
						6	70.1		
						8	90.1		
						9	76.9		
						10	41.3		
						11	44.8		
						42	39.4		
7	Procedures in Science	39	56.19	43.07	Average	34	32.7	24.3	Weak
		40	29.96			35	48.7		
						41	0.1		
						43	15.7		

