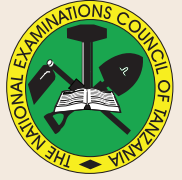




THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA



PUPILS' ITEM RESPONSE ANALYSIS
REPORT ON THE STANDARD FOUR NATIONAL
ASSESSMENT (SFNA) 2022

SCIENCE AND TECHNOLOGY



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(SFNA) 2022**

05E SCIENCE AND TECHNOLOGY

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FOREWORD

This report has been prepared to give feedback to all education stakeholders on how the Standard Four pupils responded to the assessment questions in Science and Technology subject.

Analysis of each question has been done to show how pupils mastered various competences when answering respective questions. In addition, the reasons which made the pupils respond correctly or incorrectly based on the questions required the pupils to do were analysed. The analysis of pupils' responses shows that the pupils who performed well had enough understanding of the competences that were assessed. Likewise, the pupils who did not perform well lacked knowledge about the competences assessed. Furthermore, some pupils failed to understand the questions as they lacked reading and writing skills.

The National Examinations Council of Tanzania is confident that, this report will enable various education stakeholders and other authorities to improve the teaching process and therefore develops competences of standard four pupils in the coming assessments.

The National Examinations Council of Tanzania would like to express heartfelt gratitude to all people who participated in the preparation of this report.



Dr. Said A. Mohamed
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report deals with an analysis of pupils' performance in the Standard Four National Assessment in the Science and Technology subject conducted on 26th October 2022. The assessment aimed at measuring the competences stipulated in the Primary School Syllabus for standards III and IV in Science and Technology subject.

Analysis shows that the overall performance in Science and Technology subject was good as out of 1,591,686 pupils who sat for this assessment, 1,323,783 pupils equivalent to 83.17 per cent passed the assessment and 267,546 pupils equivalent to 16.81 per cent failed. Statistical analysis indicates that the performance of the pupils in 2022 fell by 4.59 per cent compared to the results in the year 2021.

The assessment paper consisted of five (5) questions, each containing five (5) items making a total of 25 items. The paper had two sections; A and B. Section A had three (3) questions with a total of 15 items. Each item carried 2 marks to make a total of 30 marks for the whole section. Section B consisted of two (2) questions with a total of ten (10) items, and each item contained two (2) marks to make a total of 20 marks. Therefore, the total marks for all the questions in this assessment was 50. Pupils were supposed to attempt all the questions.

The questions in Section A were multiple choice items, matching items, and fill in the blanks by using the words provided in the given box. Section B consisted of a passage in which the pupils were supposed to read and then answer questions by writing the correct answers in the question paper provided. Furthermore, they were required to study the given picture and answer the questions that followed.

This analysis report focuses on assessing the quality of responses supplied by the pupils in responding to the questions. It provides the number of pupils who attempted each question and the percentages of their performance. Additionally, the reasons for pupils' ability or inability to supply a correct response according to the questions demand are provided.

Three parameters have been used to analyse performance on each question. The parameters are based on the percentage of pupils' performance on given questions. If the percentage of the pupils lies in a range of 0-33, 34-66 and 67-100 the performance was considered to be poor, average or good, respectively. Furthermore, the pupils' performance is divided into four groups according to scores obtained, namely weak (0-2), average (4-6), good (8) and very good (10). Charts have been used to elaborate more on the performance of individual questions. Moreover, samples of good and poor extracts are provided to present the quality of responses given by the pupils in response to particular questions they attempted.

2.0 ANALYSIS OF PUPILS' PERFORMANCE PER QUESTION

This part of the report analyses the performance of pupils in sections A and B.

2.1 Section A: Multiple Choice, Matching and Filling in the Blanks Items

In this section, the pupil was required to answer all questions. Each question consisted of five items. Analysis of pupils' performance on those questions is as follows:

Question 1: Applying Fundamentals of Science and Technology

This question consisted of five (5) items. In each item (i - v), the pupil was required to choose the letter of the correct answer from the given alternatives (A – D) and write it in the box provided. This question assessed the pupils' competence in mastering various scientific skills.

Analysis show that the performance on this question was good since out of 1,591,686 pupils who attempted this question, 1,286,957 (80.85%) passed and 304,729 (19.15%) failed. Generally, this question had good performance compared to other questions in this assessment since 80.85 per cent of the pupils scored 4 to 10 marks. Figure 1 shows the summary of pupils' performance on this question.

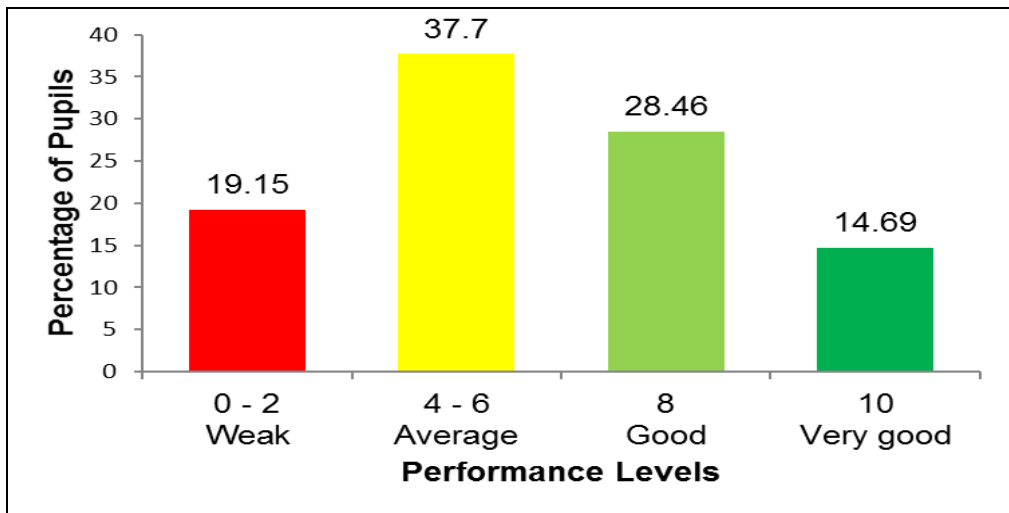


Figure 1: The summary of pupils' performance on question 1

Figure 1 shows that pupils who scored 4 to 10 marks were 80.85 per cent. Among them, 37.70 per cent scored 4 to 6 marks. Furthermore, 28.46 per cent scored 8 marks and 14.69 per cent scored all 10 marks allocated for this question. However, 19.15 per cent of the pupils either failed all items and scored 0 or got only one item correctly to obtained 2 marks.

The analysis of pupils' response in each item is as follows:

- (i) Which device is used for preserving food to avoid spoiling?
- A Cupboard
 - B Refrigerator
 - C Bottle
 - D Hotpot

In this item, the pupils who chose the correct response B, *refrigerator*, had good knowledge about the devices used for preserving food for a long time to avoid spoiling. They recognized that a refrigerator is an appliance which preserves different stuffs like food by cooling them. In so doing the appliance keeps the food fresh and preserves its taste and nutritional value.

Furthermore, the pupils who responded incorrectly lacked knowledge of devices used for preserving food to avoid spoiling. For instance, those who opted for distractor A, *cupboard*, did not know that a cupboard

stores various things like clothes and utensils. Hence, keeping food in a cupboard does not preserve its taste and nutritional value. Also, those who opted for distractor C, a *bottle*, had insufficient knowledge about the fact that a bottle can keep foods in liquid form and not otherwise. In addition, a bottle is also kept in a refrigerator to preserve the food in it. Those who chose distractor D, *hotpot*, failed to understand that a hotpot keeps cooked food hot for a few hours only. If the food is left for a long time it will be spoiled. This shows that the pupils who responded incorrectly to this part of the question were incompetent in identifying the devices used for preserving food for a long time without spoiling.

(ii) Which set does **not represent** types of cookers?

- A Charcoal cooker, electric cooker and kerosene stove.
- B Electric cooker, kerosene stove and gas cooker.
- C Charcoal cooker, electric cooker and gas cooker.
- D Electric cooker, charcoal and fire.

In this item the pupils who chose the correct answer D, *electric cooker, charcoal and fire* had sufficient knowledge about identifying the types of cookers in different sets of choices given. They understood that charcoal can be used as a source of fuel and fire is a form of heat energy, which appears when substances combine chemically with oxygen from the air to give out light and smoke. Therefore, these pupils understood that charcoal and fire are not cooking devices.

Pupils who did not perform well on this item lacked knowledge about identifying cookers. For instance, those who chose distractors; A, *charcoal cooker, electric cooker and kerosene stove*, B, *electric cooker, kerosene stove and gas cooker* and C, *charcoal cooker, electric cooker and gas cooker* did not understand the question. They could not understand that options A, B and C contained various types of cookers classified according to the energy sources they use.

(iii) Which device is used to measure the correct weight of sugar?

- A A cup
- B A plate
- C Weighing scale
- D Measuring cylinder

In this item, the pupils who chose the correct answer C, *weighing scale*, had skills on the device used to measure the correct weight of sugar. They realized that the weight of sugar is measured by a weighing scale.

Some pupils failed in this item by choosing distractors A, B or D. For instance, the pupils who chose distractor A, *a cup*, did not realise that a cup is used for keeping liquids like milk, water and cooking oil. Pupils who chose distractor B, *a plate*, did not understand that a plate is used for serving food. Those who chose distractor D, *measuring cylinder* did not realize that the measuring cylinder is used to measure the volume of liquids. This implies that these pupils were incompetent in identifying the device for weight measurement.

- (iv) Which characteristic of living things differentiates plants from animals?
- A Excretion
 - B Death
 - C Locomotion
 - D Growth

Pupils who chose the correct answer C, *locomotion* had knowledge of the characteristics that differentiate plants from animals. Such pupils understood the characteristics of living things and how they relate to plants and animals. They knew that locomotion is a movement of animals from one place to another. Plants do not move from one place to another but some of their parts grow towards stimuli.

On the other hand, some pupils failed to answer this item correctly by choosing distractors A *excretion*, B, *death* or D, *growth*. For example, pupils who chose distractor A, *excretion*, did not understand that wastes that are removed are the products of the metabolic process from the body. This characteristic is found in both plants and animals. Pupils who chose distractor B, *death*, did not realize that death is the end of life for all living things. Every organism, plants or animals, finally dies. Those who chose distractor D, *growth* did not understand that growth is an increase in height and size. Every living organism tends to increase in size and height.

(v) What is the function of a machine?

- A Simplifying work.
- B Facilitating communication.
- C Producing commodities.
- D Raising loads.

In this item, the pupils who chose the correct answer A, *simplifying work* had knowledge of the concepts of a machine and its function. They understood that the major function of machine is to simplify work.

On the other hand, pupils who chose distractors B, C or D lacked knowledge of the function of machines. For example, those who chose distractors B, *facilitating communication*, C, *producing commodities* and D, *raising loads*, did not realise that those are specific functions of some machines. They are ways of simplifying work for particular machines.

Question 2: Performing Investigations and Discoveries in Science and Technology

This question comprised five items which assessed various concepts of heat energy. In responding to items (i) – (v), the pupil was required to match statements in Group A with their corresponding answers in Group B and then write the letters of the correct answers in the brackets provided. The question read as follows:

Answer items (i) to (v) by matching statements about various concepts of heat energy in **Group A** with the corresponding concepts in **Group B**. Write the letters of the correct answers in the bracket provided.

| Group A | Answer | Group B |
|--|---------------|--------------------------------|
| (i) The way heat travels through iron | () | A. Solid B. Sun |
| (ii) Spreading of heat in the water | () | C. Fire D. Radiation |
| (iii) The way heat from the sun reaches the earth's surface. | () | E. Conduction F. Convection |
| (iv) The matter in which heat travels fast | () | G. Liquids |
| (v) The natural source of heat | () | |

The question intended to assess the pupils' competence in identifying various concepts of heat energy. Pupils who matched correctly various concepts of heat energy with the corresponding processes performed well. Those who match incorrectly had insufficient knowledge of various concepts of heat energy.

Analysis shows that the performance on this question was average since out of 1,591,686 pupils who attempted this question, 616,069 (38.70%) passed and 975,617 (61.29%) failed. Generally, this question had low performance compared to other questions in this assessment since 38.70 per cent scored 4 to 10 marks. Figure 2 provides the summary of the pupils' performance on this question.

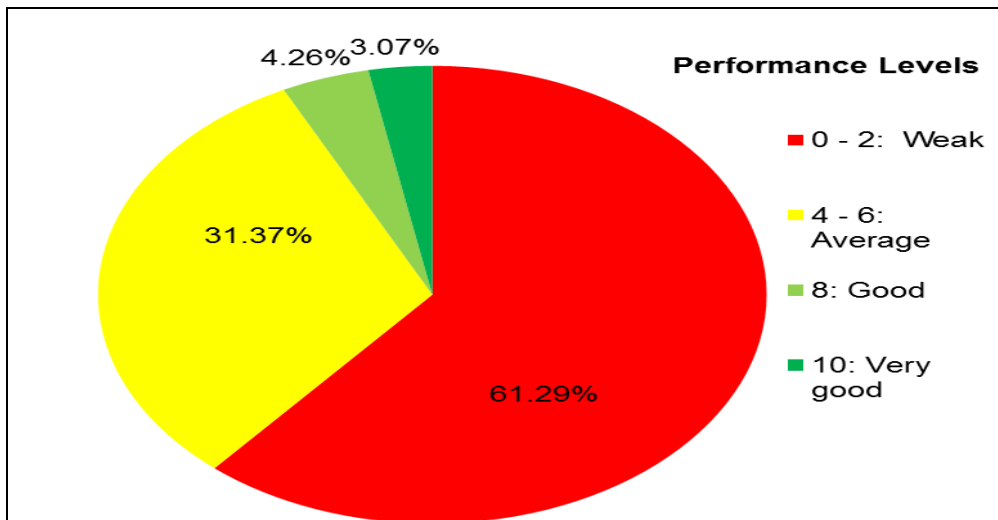


Figure 2: The summary of pupils' performance on question 2

Figure 2 shows that 61.29 per cent of pupils scored 0 to 2 marks. This indicates that these pupils were incompetent in identifying various concepts of heat energy. For instance, in item (i) which required the pupils to identify the way heat travels through iron with the corresponding process or methods, most pupils chose distractors A, *solid*, C, *fire* and G, *liquids* instead of the correct response E, *conduction*. Those who chose distractor A, *solid* did not understand that solid is the state of matter which represents hard substance and not the method in which heat travels. Those who opted for distractor C, *fire* did not understand that fire is the source of heat energy. Also, those who chose distractor G, *liquids*, were not aware that the liquid is

a state of matter. On the other hand, the pupils who chose the correct answer E, *conduction*, understood that conduction is a process by which heat energy travels through solid materials like iron. They knew that iron is a good conductor of heat.

Item (ii) assessed the ability of the pupils to identify the way of spreading heat in water. Most pupils chose distractors E, *conduction* and G, *liquids*. Those who chose E, *conduction* had insufficient knowledge that conduction is the transfer of heat through solid objects. Those who chose distractor G, *liquids*, were not aware that a liquid is the state of matter and not a way in which heat travels through water. Pupils who matched the correct response F, *convection*, knew the concept of convection, which is the transfer of heat through the liquid.

Item (iii) assessed the pupils' ability to identify a way through which heat from the sun reaches the earth's surface. The correct response to this item was D, *Radiation*. Pupils who chose the correct answer understand that radiation is the way through which heat energy travels through space. Pupils who failed in this item chose one between distractors F, *convection* and E, *conduction*. Those who matched F, *convection* did not understand that convection is the transfer of heat through liquids. Moreover, those who chose E, *conduction* had insufficient knowledge of the fact that conduction is how heat is transferred through solid substances.

Item (iv) required the pupils to identify a state of matter in which heat travels fast. The correct response to this item was A, *solid*. The pupils who matched correctly understood that solid is a state of matter in which the particles are so close thus allows heat to travel faster. The pupils who matched incorrectly chose among the distractors D, *radiation*, E, *conduction* and F, *convection*. These pupils were not aware that radiation, conduction and convection are various ways through which heat travels and not states of matter in which heat travels. Some pupils who chose distractor B, *sun*, failed to understand that the sun is a natural source of heat energy.

Item (v) assessed the ability of the pupils to identify the natural source of heat. The correct response to this item was B, *Sun*. The pupils who chose the correct response understood that the sun radiates energy in

form of light and heat, the heat from the sun occurs naturally without human involvement. The majority of the pupils failed to respond correctly to this item by choosing the wrong alternative C, *fire*. These pupils did not understand that fire is a source of heat resulting from human activities thus it's not a natural source.

Question 3: Performing Investigations and Discoveries in Science and Technology

In this question, the pupil was required to choose the correct answer from the box and write it in the space provided for each item (a – e). The question asked as follows:

Answer items (i) to (v) by choosing the correct answer from the box and write it in the space provided.

Oxygen, Food, Water, Air, Carbon dioxide, Plants

Questions:

(a) Which gas is used by plants as a raw material?

(b) Which product is obtained when different gases are combined?

(c) What is the source of food for living things?

(d) Which type of gas is directly required by animals?

(e) What is the source of nutrients for different body functions?

This question assessed pupils' competence in investigating things that are in the environment especially in recognizing living and non-living things in the environment.

Statistics show that a total of 1,591,686 pupils attempted this question. Out of whom 740,661 (46.53%) pupils passed and 851,025 (53.47%) failed. Generally, pupils had an average performance on this question since 46.53 per cent scored 4 to 10 marks. Figure 3 provides the summary of the pupils' performance on this question.

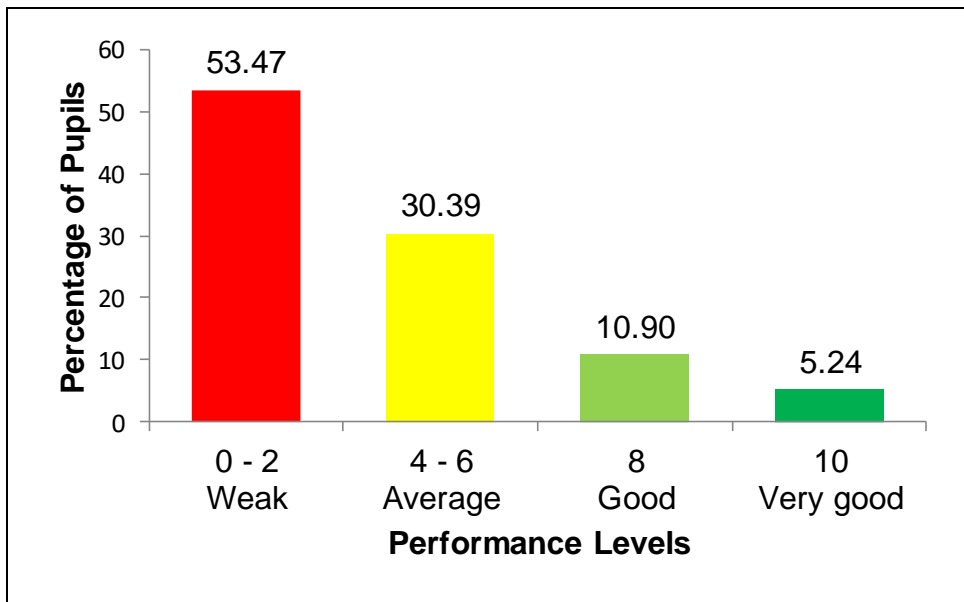


Figure 3: *The summary of pupils' performance on question 3*

Figure 3 shows that 53.47 per cent scored 0 to 2 marks and 30.39 per cent scored 4 to 6 marks. In addition, 10.90 per cent scored 8 marks and only 5.24 per cent scored all the 10 marks allocated to this question.

The analysis of pupils' responses shows that those who scored 0 to 2 marks failed to identify the correct response in almost all items. That indicates that they lacked knowledge of recognizing the relationship between the living and non-living things in the environment.

For instance, item (a) which required the pupils to identify the gas that is used by plants as a raw material. Majority of the pupils chose *Oxygen* because they thought that plants and animals require oxygen

to live. They did not understand that oxygen is a by-product of photosynthesis and not a raw material. Some pupils chose the distractors *water* and *food*. Those who chose water could not realize that water is a raw material in liquid state and not gaseous state. Likewise, those who chose food were not aware that food is a byproduct and not a raw material. Some pupils who chose the correct answer *carbon dioxide* had knowledge that carbon dioxide is a raw material used in photosynthesis process.

Item (b), assessed the ability of pupils to identify the product obtained when various gases are combined. Pupils who wrote the correct response *air* were aware that air is a product obtained when various gases in the atmosphere are combined. On the other hand, most of the pupils failed to identify the correct response to this item. That shows that they had insufficient knowledge about how different gases combined. This made most of pupils to choose distractors such as *oxygen* and *carbon dioxide* without knowing that these are individuals' gases. Some of the pupils who chose *food* were not aware that food is a chemical substance we eat and not a gas.

In item (c), the pupils were required to identify the source of food for living things. Pupils who chose the correct answer *plants* had competence that plants do manufacture food which is used by all living organisms. On the other hand, pupils who failed to respond correctly to this item had insufficient knowledge about sources of food for living things. This made most of the pupils choose distractors such as *water*, and *air*. These pupils did not understand that these are raw materials used in making food. Other pupils chose responses which do not correspond to the task of the question. For example, some pupils who chose *oxygen* were not aware that oxygen is the gas given out during the process of manufacturing food.

Item (d) assessed the ability of the pupils to identify the type of gas required directly by animals. The pupils who answered this item correctly chose *oxygen*. Thus, they were competent in recognizing that oxygen is the gas that every living animal requires for respiration. Pupils who failed to answer this item chose the wrong options such as *water*, *air*, *carbon dioxide* and *food*. These pupils lacked competence in identifying air and other materials. Those who chose *water* could not

realize that water regulates the body temperature and dissolves minerals and nutrients to make them accessible to the body. Those who chose *air*, did not understand that air is the mixture of different gases in the atmosphere such as oxygen, carbon dioxide and nitrogen. Those who chose *carbon dioxide* could not realize that carbon dioxide gas is a byproduct of respiration. Also, those who chose *food* did not realize the fact that food is not a gas rather it is a nutritious substance that animals consume to maintain life and growth.

Item (e) assessed pupils' ability to identify the source of nutrients for different body functions. The correct option was *food*. Pupils who wrote the correct option had sufficient knowledge of the source of nutrients for different body functions. Those pupils who failed wrote *air* and *water* as the correct response. Those who chose *air* were not aware that it is a mixture of different gases in the atmosphere including oxygen, carbon dioxide and nitrogen. Air is not a direct source of nutrients for different body functions. Those who chose *water* did not understand that water simply regulates body temperature and dissolves minerals and nutrients to make them accessible to the body.

Extract 1.1 provides a sample of an incorrect response from one of the pupils in question 3.

- (a) Which gas is used by plants as a raw material? Oxygen
- (b) Which product is obtained when different gases are combined?
Carbon dioxide
- (c) What is the source of food for living things? Water
- (d) Which type of gas is directly required by animals? Air
- (e) What is the source of nutrients for different body functions?
Plants:

Extract 1.1: A sample of pupils' incorrect response to question 3

In Extract 1.1, the pupil wrote incorrect responses in all parts of the question. That implies the pupil had inadequate knowledge of recognizing the relationship between the living and non-living things in the environment.

Statistics show that 5.24 per cent of the pupils were competent in investigating the relationship of things found in the Environment. Moreover, they understood the question as they chose the correct responses from the given box. Extract 1.2 provides a sample of the pupil's correct response to this question.

| | |
|---|----------------------|
| (a) Which gas is used by plants as a raw material? | <u>Carbondioxide</u> |
| (b) Which product is obtained when different gases are combined? | <u>Air</u> |
| (c) What is the source of food for living things? | <u>Plants</u> |
| (d) Which type of gas is directly required by animals? | <u>Oxygen</u> |
| (e) What is the source of nutrients for different body functions? | <u>Food</u> |

Extract 1.2: A sample of pupils' correct response to question 3

Extract 1.2 shows the response from a pupil who responded correctly to all items. This implies that the pupil had adequate knowledge and was able to recognize the relationship between the living and non-living things in the environment.

2.2. Section B: Short Answer Questions

This section consisted of question four and five. Question four required the pupil to read the passage and answer the questions that followed. In question five, the pupil was required to observe the given pictures and answer the questions.

Question 4: Maintaining Health and the Environment

Read the following passage and then answer items (a) to (e) by writing the correct answer in the space provided.

We can consider the water that we use as safe by just looking, but may not be safe for our health. This is because when water flows on the earth, it takes soil and sometimes get into contact with germs that cause diseases. Therefore, we are advised to boil water so as to kill germs. After boiling, we should filter using a clean piece of cloth so as to remove dirties. Furthermore, the boiled and filtered water is kept in a clean, well closed vessel to avoid contamination. This is now clean and safe water.

Questions:

(a) Why is it important to boil water?

(b) How does water get disease-causing germs?

(c) What should be done in order to make water clean and safe?

(d) What tool is used to filter water?

(e) Why does water kept in the vessel bearing a lid?

This question assessed pupils' competence in following principles of hygiene for good health and environment, specifically on clean and safe water for drinking.

Analysis shows that out of 1,591,686 pupils who attempted this question, 951,027 (59.75%) passed and 640,659 (40.25%) failed. Generally, pupils in this question had average performance since 59.75

per cent scored 4 to 10 marks. Figure 4 provides a summary of the pupils' performance on this question.

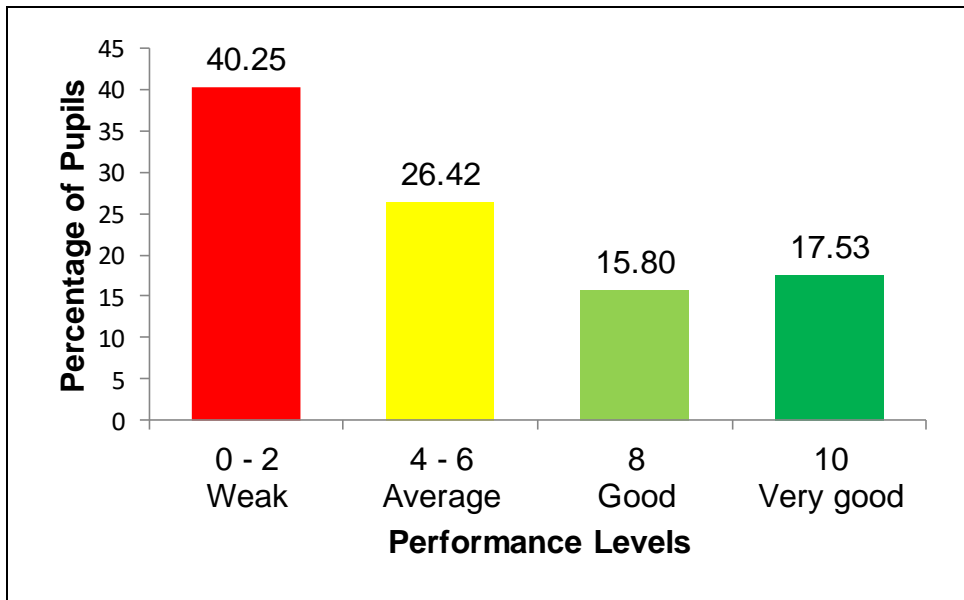


Figure 4: *The summary of pupil's performance on question 4*

Figure 4 shows that 59.75 per cent of pupils read the passage correctly and followed the instructions of the question since they had competence on clean and safe water for drinking. Among them, 40.25 per cent scored 0 to 2 marks and also 17.53 per cent scored all 10 marks allocated to this question. The pupils who scored 4 to 10 marks had sufficient knowledge of following principles of hygiene for good health and the environment specifically in using clean and safe water for drinking. For instance, they responded correctly to item (a) which required them to give reasons why it is important to boil water by writing *to kill germs*. This indicates that these pupils read and understood the passage. Hence, they stated the reason why water should be boiled. Extract 2.1 shows a sample of a pupil's correct response to question 4.

| | |
|-----|--|
| (a) | Why is it important to boil water? <u>To kill germs</u> |
| (b) | How does water get disease-causing germs? <u>This is because when water flows on the earth it takes soil and sometimes contaminates with germs.</u> |
| (c) | What should be done in order to make water clean and safe? <u>We should boil and filter</u> |
| (d) | What tool is used to filter water? <u>A clean piece of cloth</u> |
| (e) | Why does water kept in the vessel bearing a lid? <u>To avoid contamination</u> |

Extract 2.1: A sample of pupils' correct response to question 4

Extract 2.1 shows the pupil who responded correctly to all five (5) items. This implies that the pupil understood well the task of the question and had knowledge about following the principles of hygiene for good health and environment, specifically on clean and safe water for drinking. However, some pupils failed to respond to this item by writing *we should filter using a clean piece of cloth so as to remove dirt*. These pupils did not give the reasons why it is important to boil water. Rather the pupils explain the procedure of how to get clean water after boiling. Others wrote *flows on the earth it takes soil and contaminate germs that cause disease*. These pupils explained how water gets disease-causing germs instead of explaining the importance of boiling water. This indicates that the pupils did not understand the question or did not read and comprehend the passage.

Item (b) required the pupils to explain how water gets disease-causing germs. The pupils who answered this item correctly wrote *when water flows on the earth*. This shows that these pupils comprehended the passage and were competent in understanding the effect of run-off water which includes soil and sometimes get into contact with germs that cause diseases. Likewise, some pupils failed to respond correctly

to this item and wrote responses that did not correspond to the task of the question. For example, they wrote *to boil water so as to kill germs*. Some wrote responses that were not in the passage such as *kerosene stoves and electrical stoves*. This implies that these pupils failed to grasp what was written in the given passage.

Item (c) required pupils to explain what should be done in order to make water clean and safe. The pupils who responded correctly wrote, *to be boiled and filtered*. This indicates that they had knowledge about how to make water clean and safe by boiling, filtering and keeping it in a closed container. Pupils who got it wrong lacked skills in reading and grasping the passage. For example, some pupils wrote *to kill germs*. These pupils did not understand the question since they had not been asked to state the importance of boiling water. Instead, they were required to explain what should be done to make water clean and safe. Some of the pupils wrote responses such as *teeth, medicine and drum*. These responses did not relate to the context of the question and were not part of the passage.

Item (d) required the pupils to identify the tool used to filter water. Pupils who answered that part correctly wrote *clean piece of cloth*. This shows that these pupils comprehended the passage well. Others wrote about the uses of water instead of the tool used to filter water as they wrote, *for bathing and for cooking*. This group of pupils had inadequate knowledge about filtering water. They did not realize that a clean piece of cloth is used to filter water after boiling. Moreover, some students wrote *it kept in clean well closed vessels to avoid contamination*. These pupils did not understand the question. Instead of mentioning the tool used to filter water, they explained the storage of water after being boiled and filtered.

Item (e) assessed the pupils' understanding of the importance of keeping water in the vessel bearing a lid. The pupils who responded correctly explained the importance of keeping water in a container with a lid as they wrote, *to avoid contamination*. These pupils had knowledge, skills and a good understanding of the importance of keeping water in a well closed vessel. On the other hand, some pupils wrote responses that are not related to the task of the question such as

freezing point of water and boiling point of water. This shows that these pupils did not comprehend the passage.

Regardless of the performance of 59.75 per cent in this question, 40.25 per cent of pupils failed in all five items or responded correctly to only one item. This shows that these pupils failed to comprehend the passage and had insufficient knowledge of the principles of hygiene for good health and environment, specifically on clean and safe water for drinking. Extract 2.2 shows a sample of pupil's incorrect response to question 4.

- (a) Why is it important to boil water?
Because when water flows on the earth it takes soil safe for our health
Sometimes contaminates with germs that cause disease
- (b) How does water get disease-causing germs?
Therefore we are advised to boil water so as to kill germs
After boiling, we should filter using a clean piece of cloth so as to remove dirt
- (c) What should be done in order to make water clean and safe?
by just boiling but may not be.
Safe for our health
- (d) What tool is used to filter water?
is kept in a clean, well-closed vessel to avoid contamination
This is now clean and safe water
- (e) Why does water kept in the vessel bearing a lid?
Because flows on the earth
It soil and sometimes contaminates

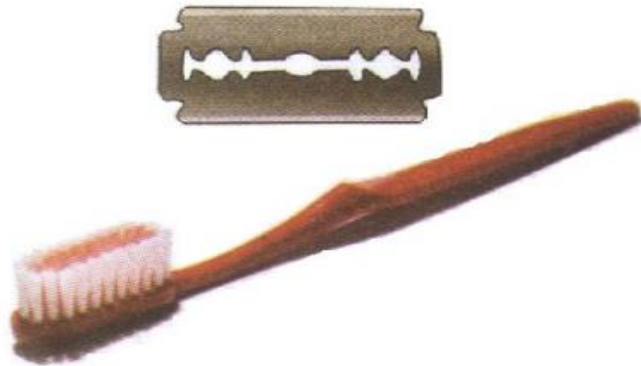
Extract 2.2: A sample of pupils' incorrect response to question 4

Extract 2.2 shows a sample of a pupil's incorrect response to question 4. This pupil failed to respond to all items by writing answers that were not related to the question. The pupil lacked knowledge of following principles of hygiene for good health and environment, especially on clean and safe water for drinking.

Question 5: Maintaining Health and the Environment

The pupil was required to observe the picture and then answer the questions for each item (a) to (e). The question asked:

Investigate the following pictures and then answer items (a) to (e).



Questions:

(a) What are the names of the objects shown in the pictures?

(i) _____

(ii) _____

(b) What disease is transmitted by sharing those objects?

(c) Which method is used to identify a person affected by the disease mentioned in part (b)?

(d) What other way may cause the transmission of the disease mentioned in part (b)?

(e) Why is it advised not to isolate the victim of the disease mentioned in part (b)?

The question assessed pupils' competence in following health principles for good health specifically on different concepts concerning HIV/AIDS.

Statistical analysis shows that out of 1,591,686 pupils who attempted this question, 764,903 (48.05%) pupils passed and 826,783 (51.94%) failed. Generally, this question had average performance since 48.05 per cent of the pupils responded correctly in 2 to 5 items. Figure 5 provides the summary of the pupils' performance on this question.

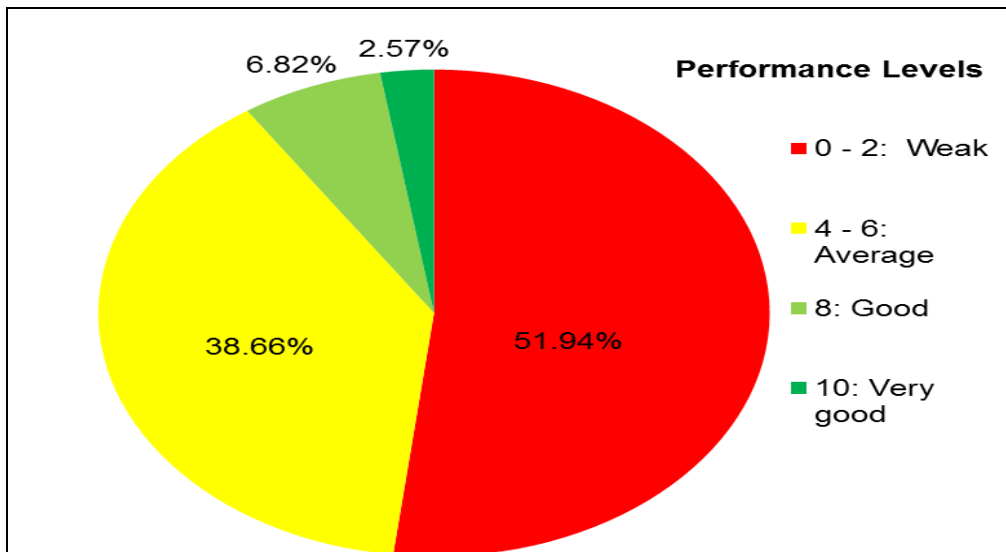


Figure 5: *The summary of pupils' performance on question 5*

Figure 5 shows that 51.94 per cent of the pupils scored 0 to 2 marks. Moreover, 6.82 per cent scored 8 marks and only 2.57 per cent scored all 10 marks allocated to this question.

Statistics show that 51.94 per cent of the pupils failed to respond correctly to this question. This shows that these pupils had inadequate knowledge and skills in observing and interpreting pictures of objects and how such pictures are associated with various concepts of HIV/AIDS.

For instance, in item (a) which assessed the pupils' ability to identify the names of the objects shown in the pictures. The pupils who named the objects correctly wrote (i) *razor blade* (ii) *tooth brush*. These pupils had knowledge and skills on observing and recognizing the objects in

the pictures. Moreover, the majority of pupils failed to write the correct answer. This implies they had inadequate skills in observing and interpreting the tools shown in the picture. For example, some pupils wrote; *used to brush our teeth* and *to cut finger nail*. These pupils did not understand the question. Instead of naming the objects, they explained the uses of the objects. Some pupils failed to recognize the pictures and wrote incorrect response like a *radio* and *hoe*. These pupils had poor observation skills and failed to relate the pictures with real objects.

Item (b) assessed the pupils' ability to name a disease transmitted by sharing the objects in the picture. Those pupils who answered correctly wrote *AIDS*. This indicates that the pupils had sufficient knowledge of the effect of sharing sharp objects. They also knew the way AIDS is transmitted from the victim to another person when sharing the objects like razor blade and toothbrush. Nevertheless, the majority of the pupils failed to respond correctly to this item and wrote diseases like *malaria* and *cholera*. For those who wrote malaria did not remember that malaria is spread by a female mosquito called Anopheles and those who wrote cholera did not realize that cholera is transmitted by a housefly that carries cholera pathogens. This implies that the pupils lacked knowledge of the diseases that are transmitted by sharing sharp objects such as razor blades and tooth brushes.

Item (c) measured the pupils' ability to recognize the method used to identify a person affected by the disease mentioned in part (b). The pupils who recognized the method correctly wrote *blood test or diagnosis or blood screening*. These pupils had knowledge and skills to the method used to identify a person affected by AIDS. Nonetheless, most of the pupils who failed to identify the method used to recognize a person affected with AIDS wrote *through virus, using toothbrush* and coughing. This shows that these pupils were incompetent in the means through which the disease is diagnosed. For example, those who wrote, through virus did not understand that a virus is a micro-organism that causes various diseases and is not a method of identifying an affected person. For those who wrote using *toothbrush* did not understand that toothbrush is a tool for brushing teeth. On the other hand, those who wrote through coughing could not realize that coughing is a viral infection that occur in the respiratory system. Some

of the pupils wrote, *by water* and *with electricity*. This group of pupils did not understand that it is impossible to diagnose a person who is suffering from AIDS with water and electricity.

Item (d) assessed the pupils' ability to mention any other way that may cause the transmission of the disease mentioned in part (b). The pupils who answered correctly wrote one of the following: *unsafe sex with HIV infected person, blood transfusion from an infected person, infected mother to her baby during delivery, from an infected mother to her baby during breast feeding* and *by sharing sharp objects with an infected person*. This indicates that the pupils identified other ways that may cause the transmission of AIDS. However, the majority of the pupils failed to mention other ways of transmitting AIDS by writing incorrect answers such as *by sharing things*, and *sharing underwear*. For those who wrote by sharing things were not aware that HIV/AIDS is not transmitted through sharing things. And those who wrote by sharing underwear did not understand that sharing underwear causes skin infections, fungus and other skin related diseases and not HIV/AIDS. This implies that pupils lacked enough knowledge about other ways in which AIDS is transmitted.

Item (e) assessed the pupils' ability to explain why it is advised not to isolate the victim of the disease mentioned in part (b). The pupils who explained correctly wrote *because HIV/AIDS is not transmitted through socializing with HIV infected person, to help HIV infected person not be stressed, make HIV person feel loved, valued and have contribution to the society and to stop stigmatization*. This shows that the pupils had knowledge and skills about why we should not isolate the victim of AIDS and also, they know that, HIV/AIDS victims are human beings like other normal citizens who are supposed to be loved and taken care. On the other hand, the pupils who failed to identify the reason for not isolating the victims of HIV/AIDS had insufficient knowledge about HIV/AIDS. For example, some of them wrote, *no contact, doesn't cause infection*, and *to protect from getting diseases*. These answers indicate that, these pupils lacked knowledge about the reasons for not isolating a person suffering from HIV/AIDS. Extract 3.1 provides a sample of pupil's who incorrectly responded to question 5.

(a) What are the names of the objects shown in the pictures?

(i) TOOTH BRUSH BRUSHE

(ii) PAZOR BLAND

(b) What disease is transmitted by sharing those objects?
HIV/AIDS MALARA

(c) Which method is used to identify a person affected by the disease mentioned in part (b)?
TOOTH BRUSH

(d) What other way may cause the transmission of the disease mentioned in part (b)?
CAN CAUSE OTHER DISEASE

(e) Why is it advised not to isolate the victim of the disease mentioned in part (b)?
IF YOU SHARE A TOOTH BRUSH OF A ~~PER~~ PERSON WHO
IS SICK U SHARKY CAUSE DISEASE

Extract 3.1: A sample of pupils' incorrect response to question 5

Extract 3.1 shows a sample of pupil's incorrect response from a pupil who failed to respond to all items by writing the answers that are not related to the task of the question. This shows that such pupils lacked knowledge of observing objects seen in the picture and failed to associate it with various concepts concerning HIV/AIDS.

Statistical analysis shows that only 2.57 per cent of the pupils answered all five (5) items correctly by scoring all 10 marks. This implies that these pupils were competent in observing the objects seen in the picture and associates it with various concepts of HIV/AIDS. Extract 3.2 is a sample of the pupil's correct response to question 5.

(a) What are the names of the objects shown in the pictures?

(i) Razorblade

(ii) Toothbrush

(b) What disease is transmitted by sharing those objects?

AIDS

(c) Which method is used to identify a person affected by the disease mentioned in part (b)?

by testing his/her blood

(d) What other way may cause the transmission of the disease mentioned in part (b)?

Having unprotected sexual intercourse

(e) Why is it advised not to isolate the victim of the disease mentioned in part (b)?

In order to give him/her hope

Extract 3.2: A sample of pupils' correct response to question 5

Extract 3.2 shows the response from a pupil who correctly responded to all items. This implies that the pupil understood the question well and had competence in observing the objects seen in the picture and associated it with various concepts of HIV/AIDS.

3.0 ANALYSIS OF PUPILS' PERFORMANCE IN EACH COMPETENCE

Standard four National Assessment (SFNA 2022) for Science and Technology subject consisted of three main competences which were, Performing Scientific Investigation and Technological Discovery, Applying Fundamentals of Science and Technology and Maintaining Health and Environment. Statistics show that the pupil's performance was good (80.85%) in the competence of Applying Fundamentals of Science and Technology and average in two competences, Performing Scientific Investigation and Technological Discovery (42.62%) and Maintaining Health and Environment (53.90%). Though the performance in the competence of Performing Scientific Investigation and Technological Discovery was average (42.62%), it was the

competence with the lowest performance compared to other competences in this assessment.

Further analysis indicates that, the performance of the competence of Applying fundamentals of Science and Technology in 2022 has increased by 19.70 per cent as compared to the year 2021. In the competence of Maintaining Health and Environment in the year 2022, the performance fell by 5.40 per cent as compared to that in the year 2021. Furthermore, in the competence of Performing Scientific Investigation and Technological Discovery the pupil's performance rose by 19.02 per cent in 2022 as compared to that of the year 2021. Though the performance in the competence on Performing Scientific Investigation and Technological Discovery rose by 19.02 per cent in the year 2022 it was the competence with the lowest performance in the year 2022 compared to other competence assessed. Low performance in this competence was due to pupils' inadequate competence in understanding various concepts of heat energy and investigating various things in the environment. The summary of statistical performance in each competence is shown in the **appendix** that appears at the end of this report.

4.0 CONCLUSION

The general performance of the pupils in each competence in the Science and Technology subject for the year 2022 was average as 59.12 per cent of the pupils passed the assessment. Statistics show that the pupils were more competent in mastering various scientific skills whereas question 1 which assessed the competence of Applying fundamentals of Science and Technology had a good performance of 80.85 per cent. The competence of Performing Scientific Investigation and Technological Discovery had weak performance of 42.62 per cent. This competence was assessed in question number 2 and 3 which was based on heat energy sources and heat transfer in various states of matter and recognizing living and non-living things in the environment.

It is the expectation of the National Examinations Council of Tanzania that the recommendations given in this report will be taken into consideration to improve the performance of the pupils in the coming assessments.

5.0 RECOMMENDATIONS

In order to improve the level of performance on the competence of Performing Scientific Investigation and Technological Discovery the following are recommended:

- (a) In teaching competence of investigating various things in the environment, the teachers should give pupils various activities that will enhance skills of recognizing various things, especially in school's library or specific area in teaching practical activities in their daily environment.

- (b) In teaching competence of identifying various types of energy and their uses, the teachers should guide pupils to perform adequate activities during the teaching and learning process on the concepts of heat energy and how heat travels through different states of matter. The competence should be taught by relating to the pupil's daily life that will help the pupils to understand various concepts.

APPENDIX

A COMPARISON OF THE PUPILS' PERFORMANCE IN EACH COMPETENCE IN 2021 AND 2022 SFNA SCIENCE AND TECHNOLOGY SUBJECT

| No. | Competence | SFNA 2021 | | | | SFNA 2022 | | | |
|-----|---|-----------------|----------------------------------|--|---------|-----------------|----------------------------------|--|---------|
| | | Question Number | Performance in each Question (%) | Average performance on each competence (%) | Remarks | Question Number | Performance in each Question (%) | Average performance in each competence (%) | Remarks |
| 1. | Applying fundamental s of Science and Technology | 1 | 70.30 | 61.15 | Average | 1 | 80.85 | 80.85 | Good |
| | | 5 | 52.00 | | | | | | |
| 2. | Perform Scientific Investigation and Technologic al Discovery | 3 | 23.60 | 23.60 | Poor | 2 | 38.70 | 42.62 | Average |
| | | | | | | 3 | 46.53 | | |
| 3. | Maintaining Health and Environment | 2 | 50.30 | 59.30 | Average | 4 | 59.75 | 53.90 | Average |
| | | 4 | 68.20 | | | 5 | 48.05 | | |

