



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**

MATHEMATICS



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04E MATHEMATICS

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FOREWORD

The Mathematics Pupils' Items Response Analysis report for Standard Four National Assessment (SFNA) 2022 has been prepared to provide feedback to pupils, teachers, curriculum developers, policy makers and other education stakeholders on how pupils responded to the assessment questions.

The report has five sections: introduction, analysis of the pupils' responses in each question, analysis of the pupils' performance in each competence, conclusion and recommendations.

In this report, factors that influenced the pupils' performance in each individual item have been presented. The analysis of data shows that in 2022, the pupils had an average performance because 49.7 percent of 1,591,345 pupils who sat the assessment passed the assessment. The average performance was attributed to the pupils' ability to correctly respond to at least two out of five parts of each question in the assessed competencies.

However, a total of 800,431 (50.3%) pupils had weak performance. The weak performance in the assessed competencies was due to pupils' failure to apply different mathematical formulae, use information from drawings and tables, use the Reading, Writing and Arithmetic (3R's) skills and perform mathematical operations in answering the assessment questions.

Further analysis shows that the pupils had an average performance in the competence of *Applying Statistical Skills to Present Different Pieces of Information and* weak performance in the remaining competencies. Thus, the recommendations provided will enable the educational stakeholders to improve pupils' performance in the assessed competencies in the future.

The National Examinations Council of Tanzania would like to express its gratitude to the Examinations Officers and other experts for their participation in preparing this report at different levels.



Dr. Said A. Mohamed
EXECUTIVE SECRETARY

1.0 INTRODUCTION

The Standard Four National Assessment in Mathematics (SFNA) was held on 26th October, 2022. A total of 1,718,896 pupils were registered, of whom 1,591,345 (92.58%) pupils sat for the Mathematics subject assessment.

The analysis of the assessment results in 2022 in the Mathematics subject shows that 790,883 pupils, which is equivalent to 49.70 percent passed. In 2021, a total of 1,560,693 pupils, which is equivalent to 92.8 percent, were assessed and out of those, 1,083,166 pupils, which is equivalent to 69.41 percent, passed. This shows a drop of 19.71 percent in the 2022 performance compared to that of 2021. The comparison of the pupils' performances in 2022 and 2021 assessments in different grades are as indicated in Figure 1.

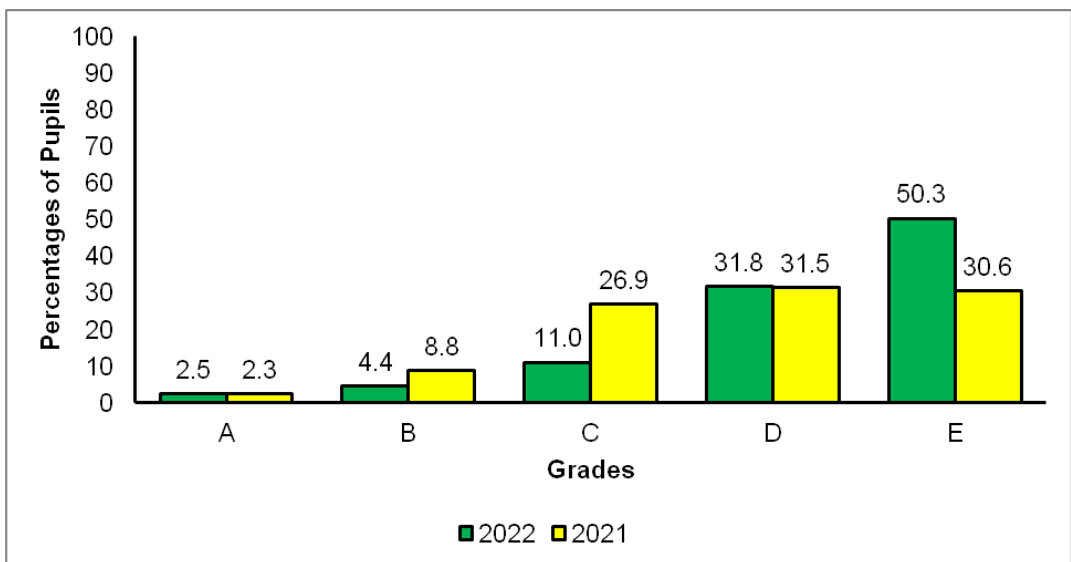


Figure 1: Comparison of pupils' grades in 2021 and 2022

The mathematics assessment paper consisted of five (5) questions. Each question had five (05) parts namely (a), (b), (c), (d), and (e). The

correct answer in each part was awarded two (02) marks. Thus, each question weighed ten (10) marks, making a total of 50 marks for the entire paper.

The pupils' responses to each question are analyzed in order to identify the reasons that made them pass or fail. Samples of Extracts from some of the pupils' responses have been presented to show how they responded to the questions.

The percentage of the pupils who passed each question was used to determine the performance standards. The analysis of performance in each question was categorized into four groups as follows: 10 marks for "*very good performance*"; 8 marks for "*good performance*"; from 4 to 6 marks for "*average performance*"; and from 0 to 2 marks for "*weak performance*." On the other hand, the standards of performance by competence were done based on the percentage of pupils who passed in each competence, where 67–100 indicates *good performance*, 34–66 indicates *average performance*, and 0–33 indicates *weak performance*.

2.0 ANALYSIS OF PUPILS' RESPONSES ON EACH QUESTION

In this report, statistics of the pupils' performance on each question or specific competence have been presented using charts or tables to show the pupils' performance on each question. Different colours were used to represent the pupils' performance. The colours were green, light green, yellow and red which represented *very good*, *good*, *average* and *weak performance* respectively.

Generally, the analysis of the pupils' responses revealed an average performance on question 5 and a weak performance on questions 1, 2, 3 and 4. In this section, each question was analyzed based on the pupils' performance. Extracts have been used to support the pupils' responses on each question.

2.1 Question 1: Applying the Concepts of Numbers to Communicate in Different Contexts

This question had five parts that assessed the pupils' competence in applying the concepts of whole numbers to communicate in different contexts, as follows:

- (a) Ana was given an orange, she ate $\frac{1}{4}$ of it. What fraction remained?
- (b) Write 99,001 in expanded form.
- (c) The place value of X in XVIII is _____.
- (d) Write in Roman the number which is between 48 and 50.
- (e) Which number should be added to 4,392 to get 7,005?

This question assessed pupils' ability to: (a) calculate the remaining part of an orange; (b) write a number in an expanded form; (c) write

the place value of X in XVIII; (d) write the number between 48 and 50 in Roman and (e) calculate the number that could be added to 4,392 to get 7,005.

The data analysis shows that the pupils' performance on this question was weak, as 1,318,574 pupils, equivalent to 82.84 percent, scored 0 to 2 marks. Among them, 62.65 percent scored zero. On the other hand, 266,741 (16.76%) pupils scored 4 to 10 marks, with 0.83 percent scoring all 10 marks. The summary of the pupils' performance on question 1 is shown in Figure 2.

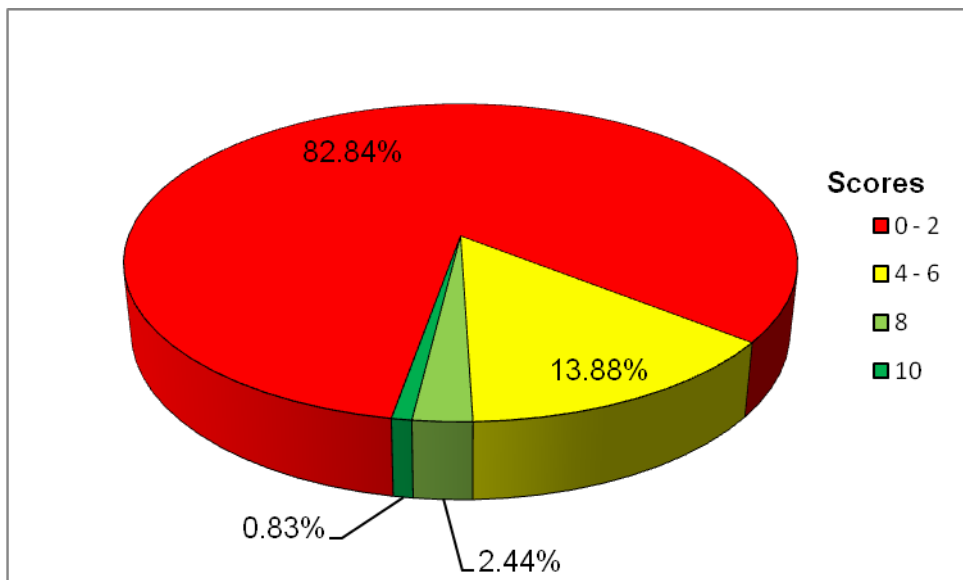


Figure 2: *Pupils' performance on Question 1*

As seen in Figure 2, many pupils scored 0 to 2 marks indicating a weak performance. This weak performance was due to pupils' inability to apply the concepts of numbers to communicate ideas and concepts in different contexts. In part (a), they failed to find the remaining part of an orange. For instance, one of the pupils added one orange to four oranges to get five oranges, which was incorrect. Another pupil drew a rectangle and divided it into four equal parts, shaded one part and

regarded the un-shaded parts as the remaining part of an orange. Also, another pupil subtracted $\frac{1}{4}$ from $\frac{1}{4}$ to get $\frac{0}{4}$, which was incorrect. Another pupil considered the eaten part of the orange as the remaining fraction, thus he/she wrote $\frac{1}{4}$ instead of $\frac{3}{4}$. In part (b), they failed to write 99,001 in an expanded form. For instance, one pupil presented 99,001 in the expanded form as $90,000+900+1$ instead of $90,000+9,000+1$. Another pupil added the digits of 99,001 to get 19, contrary to the requirements of the question.

In part (c), they were unable to write the place value of X in the Roman number XVIII due to a lack of skills to identify Roman numbers. For example, there were pupils who had the misconception that adding XL to XVII would give the required place value of X as XVIIIXL which was incorrect. In part (d), the pupils could not write the number 49 between 48 and 50 in Roman as XLIX. For instance, several pupils subtracted 48 from 50 to get 2, which was wrong. Other pupils calculated the sum of 48 and 50 to get the incorrect answer of 98. In part (e), the pupils lacked the necessary skills to add an unknown number to 4,392 to get a total of 7,005. For instance, most pupils added the given numbers to get the incorrect answer of 11,397. Other pupils copied numbers that were provided in the question and did not proceed to calculate the required answer. Extract 1.1 shows a sample of an incorrect answer provided by one of the pupils on question 1.

(b)	Write 99,001 in expanded form.	900000+9000+0+0+1	900000+9000+0+0+1
(c)	The place value of X in XVIII is _____.	XVIII └ Ten thousands. X is in Ten thousands	X is in ten thousands.

Extract 1.1: A sample of an incorrect response to question 1

In Extract 1.1, the pupil wrote 99,001 incorrectly as 900,000+9,000+0+0+1 in part (b). In part (c), the pupil identified the place of X as ten thousands instead of tens.

Despite the weak performance, there were 50,642 pupils, equivalent to 1.64 percent, who answered this question correctly. The pupils managed to apply the concepts of numbers to communicate ideas and concepts in different contexts. In part (a), they subtracted $\frac{1}{4}$ from $\frac{4}{4}$

correctly to get $\frac{3}{4}$. In part (b), they correctly wrote 99,001 in an expanded form as 90,000 + 9,000 + 000 + 00 + 1. This reveals that they had sufficient knowledge of the place value of each digit in the number 99,001.

In part (c), they wrote the place value of the digit X in the number XVIII as tens. This shows that they had knowledge that the place value of a digit depends on its position in a number. Hence, the second position from the right-hand side of the number represents tens. In part (d), they were able to write the number 49 between 48 and 50 in Roman as XLIX. This indicates that they had sufficient knowledge of Roman

numbers from 1 to 50. In part (e), they correctly subtracted 4,392 from 7,005 to get 2,613. Extract 1.2 shows a sample of a correct answer from one of the pupils who answered question 1 correctly.

No	Question	Working Space	Answer
1. (a)	Ana was given an orange, she ate $\frac{1}{4}$ of it. What fraction remained?	<p><u>SOLUTION</u> <u>GIVEN</u> <u>DATA</u></p> $\frac{1}{4} = \frac{4}{4} - \frac{1}{4} = \frac{3}{4}$ $= \frac{3}{4}$	$= \frac{3}{4}$
(b)	Write 99,001 in expanded form.	<p><u>SOLUTION</u> <u>GIVEN</u> <u>DATA</u></p> $99,001$ $= 90000 + 9000 + 0 + 0 + 1$	$= 90000 + 9000 + 0 + 0 + 1$
(c)	The place value of X in XVIII is _____.	<p><u>SOLUTION</u> <u>GIVEN</u> <u>DATA</u></p> $XVIII = XV + III$ $\begin{array}{r} X = 10 \\ VIII = + 8 \\ \hline T = 18 \end{array}$ <p>= TENS</p>	= TENS
(d)	Write in Roman the number which is between 48 and 50.	<p><u>SOLUTION</u> <u>GIVEN</u> <u>DATA</u></p> $48, 49, 50$ $49 = 40 + 9$ $40 = XL$ $9 = IX$ $= XLIX$	= XLIX

(e)	Which number should be added to 4,392 to get 7,005?	<p style="text-align: center;"><u>SOLUTION</u></p> <p style="text-align: center;"><u>GIVEN</u></p> <p style="text-align: center;"><u>DATA</u></p> $\begin{array}{r} 6^{\text{g}} \\ 7005 \\ -4392 \\ \hline 2613 \end{array}$ $\begin{array}{r} 11 \\ 4392 \\ +2613 \\ \hline 7005 \end{array}$ <p style="text-align: center;">= 2613</p>	= 2613
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Extract 1.2: A sample of a correct response to question 1

In Extract 1.2, the pupil gave the correct answers in all parts by using proper mathematical operations.

2.2 Question 2: Applying the Concepts of Patterns to Solve Problems in Everyday Life

The question had five parts that assessed the pupils' competence in applying the concepts of patterns to solve different problems in daily life. The question was as follows:

- (a) One step of a tortoise is 5 cm. How many steps will it take to move 30 cm?
- (b) Juliasi has five children whose ages differ by 5 years from each other. If the first born is 35 years old, how old is the fourth child?
- (c) Four countries got independence as follows: Kenya 1962, Tanganyika 1961, Uganda 1963 and Zimbabwe 1980. Which was the first country to get independence?
- (d) The monthly test results of Gladness increased by 12 marks every month. If she got 186 marks in the first month, how many marks did she get in the fourth month?

- (e) Mji mpya primary school elects its leaders after 2 years. If the last election was done in 2018, in which year did the next election done?

This question assessed the pupils' ability to: (a) apply the basic mathematical operations to identify the steps a tortoise would take to move; (b) solve word problems on number patterns in a specific order; (c) arrange events of numbers in ascending orders; (d) solve word problems related to a pattern of marks in ascending order and (e) solve word problems related to time in years.

The analysis of data shows that 1,591,702 pupils answered the question. Out of whom, 1,210,676 (76.06%) pupils scored 0 to 2 marks, 325,368 (20.45%) pupils scored 4 to 6 marks, 40,478 (2.54%) pupils scored 8 marks and 15,180 (0.95%) pupils scored 10 marks. Generally, the performance of the pupils on this question was weak. The summary of pupils' performance on this question is shown in Figure 3.

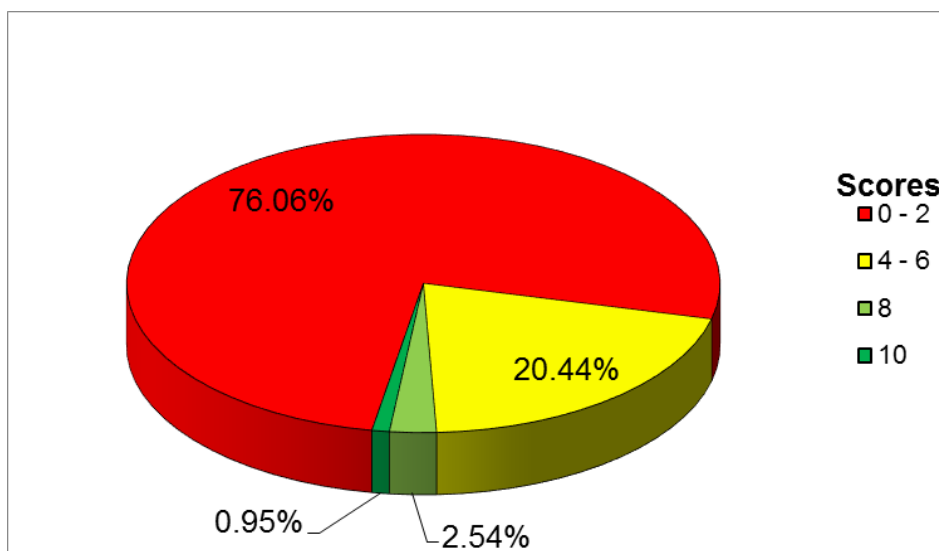


Figure 3: Pupils' Performance on Question 2

As it is observed in Figure 3, 76.06 percent of the pupils who attempted this question scored 0 to 2 marks. Those pupils who scored low marks lacked competence in applying the concepts of patterns to solve different problems in daily life. In part (a), some pupils failed to recognize that a tortoise would move 30 cm in six steps by dividing 30 cm by 5. Instead, they multiplied 30 cm by 5 cm and got 150 cm. Other pupils calculated the difference between the total distance of 30 cm and the distance of one step, 5 cm, and got the incorrect answer of 25 cm. Also, other pupils added a distance of 30 cm to 5 cm to get 35 cm.

In part (b), most pupils computed the age of the fourth child incorrectly by adding 15 to the age of the first child to get 50 years instead of subtracting 15 from 35 to get 20 years. Also, other pupils added 5 to the age of the first child to get 40 years. Likewise, other pupils subtracted 5 from the age of the first child to get 30 years, which was an incorrect answer. In part (c), the pupils failed to identify the first country to get independence by rearranging the given years in the ascending of independence. The pupils added the years of independence to get 7,866. Based on the year with the highest number (1980), other pupils wrote Zimbabwe as the first country to gain independence. Other pupils correctly identified the first year of independence rather than the country, as instructed.

In part (d), the pupils failed to calculate the marks scored in the fourth month based on a sequence that increases by 12 marks every month. For instance, some pupils added 12 marks to the marks scored in the first month (186) to get 198 which were marks for the second month. Other pupils subtracted 12 from 186 to get 174. Also, there were

pupils who computed the product of 186 and 12 to get 2,232. In part (e), the pupils failed to calculate the year in which the next election would be held after 2 years. For example, they subtracted 2 from 2018 to get 2016 instead of adding to get 2020. Other pupils did not understand the question as they multiplied 2018 by 2 to get 4,036. Also, other pupils divided 2018 by 2 to get 1009, contrary to the demand of the question. Extract 2.1 shows part of the incorrect responses from one of the pupils who answered question 2.

(c)	Four countries got independence as follows: Kenya 1962, Tanganyika 1961, Uganda 1963 and Zimbabwe 1980. Which was the first country to get independence?	$ \begin{array}{r} 2 \\ 1962 \\ +1963 \\ 1980 \\ \hline 2905 \end{array} $	2905.
(d)	The monthly test results of Gladness increased by 12 marks every month. If she got 186 marks in the first month, how many marks did she get in the fourth month?	$ \begin{array}{r} 186 \\ -12 \\ \hline 174 \end{array} $	174.
(e)	Mji mpya primary school elects its leaders after 2 years. If the last election was done in 2018, in which year did the next election done?	$ \begin{array}{r} 2018 \\ \times 2 \\ \hline 4036 \end{array} $	4036.

Extract 2.1: A sample of incorrect responses to Question 2

In Extract 2.1, the pupil added the years of independence instead of identifying the first country to get independence in part (c). In part (d), the pupil subtracted 12 from 186 marks, and in part (e), the pupil multiplied 2018 by 2 instead of adding to get the year in which the next election would be held.

On the other hand, 3.49 percent of the pupils who answered this question scored 8 to 10 marks, of whom 0.95 scored 10 marks. The pupils who scored full marks divided 30 cm by 5 cm to get 6 and concluded that a tortoise would take 6 steps to move 30 cm in part (a).

In part (b), they subtracted 15 years from the age of the firstborn to get 20 years which was the age of the fourth child. In part (c), the pupils rearranged countries based on the years of their independence in ascending order as follows: Tanganyika 1961, Kenya 1962, Uganda 1963, and Zimbabwe 1980. According to that rearrangement, they realized that the first country to get independence was Tanganyika. In part (d), the pupils were able to add 36 to the marks of the first month and got 222 which were the marks obtained in the fourth month. Moreover, in part (e), the pupils added 2 years to the year of the election 2018 to get 2020, which was the year of the next election. A sample of a correct answer from one of the pupils is shown in Extract 2.2.

2. (a)	One step of a tortoise is 5 cm. How many steps will it take to move 30 cm?	$\begin{array}{r} 6 \text{ steps} \\ 5 \overline{) 30} \\ \underline{-30} \\ \hline \end{array}$	6 steps
(b)	Juliasi has five children whose ages differ by 5 years from each other. If the first born is 35 years old, how old is the fourth child?	$\begin{array}{r} 35 \\ -5 \\ \hline 30 = 2 \\ \hline 25 \\ -5 \\ \hline 20 = 3 \\ \hline 15 \\ -5 \\ \hline 10 = 4 \\ \hline 5 \\ -5 \\ \hline 0 = 5 \end{array}$ <p>The fourth is 20 years old</p>	The fourth is 20 years old
(c)	Four countries got independence as follows: Kenya 1962, Tanganyika 1961, Uganda 1963 and Zimbabwe 1980. Which was the first country to get independence?	<p>Kenya 1962 (2) Tanganyika 1961 (1) Uganda 1963 (3) Zimbabwe 1980 (4)</p> <p>Tanganyika 1961</p>	Tanganyika 1961
(d)	The monthly test results of Gladness increased by 12 marks every month. If she got 186 marks in the first month, how many marks did she get in the fourth month?	$\begin{array}{r} 186, 198, 210, 222 \\ + 12 \\ \hline 210 \\ + 12 \\ \hline 222 \end{array}$	222 marks
(e)	Mji mpya primary school elects its leaders after 2 years. If the last election was done in 2018, in which year did the next election done?	$\begin{array}{r} 2018 \\ + 2 \\ \hline 2020 \end{array}$	2020

Extract 2.2: A sample of a correct response to question 2

In Extract 2.2, the pupil managed to apply the concepts of patterns to solve problems in all parts of the question and got the correct answers.

2.3 Question 3: Applying Basic Mathematical Operations to Solve Problems

This question had five parts, which assessed the ability of pupils to apply the concepts of basic mathematical operations to solve problems. The question was as follows:

- (a) Find the difference between 39,365 and 33,868.
- (b) Aisha has divided 350 mangoes equally into 10 groups. How many mangoes are there in each group?
- (c) Baraka is paid 4,000 shillings per day. If he works for 40 days, how much will he be paid?
- (d) Joeli bought a radio and sold it for 60,500 shillings. If he got a profit of 20,000 shillings, what was the buying price of the radio?
- (e) A hen incubates its eggs for 21 days. How many weeks are equal to this period?

This question assessed the pupils' ability to: (a) calculate the difference between two numbers; (b) divide whole numbers; (c) multiply the amount of money by a whole number; (d) calculate the buying price; and (e) calculate the number of weeks in 21 days.

According to the data analysis, 1,591,703 (100%) pupils attempted this question, with 27,832 (1.75%) scoring 10 marks, 41,804 (2.63%) scoring 8 marks, 162,518 (10.21%) scoring 4 to 6 marks and 1,359,549 (85.41%) scoring 0 to 2 marks. Generally, the pupils' performance on this question was weak. Figure 4 presents a summary of the pupils' performance on question 3.

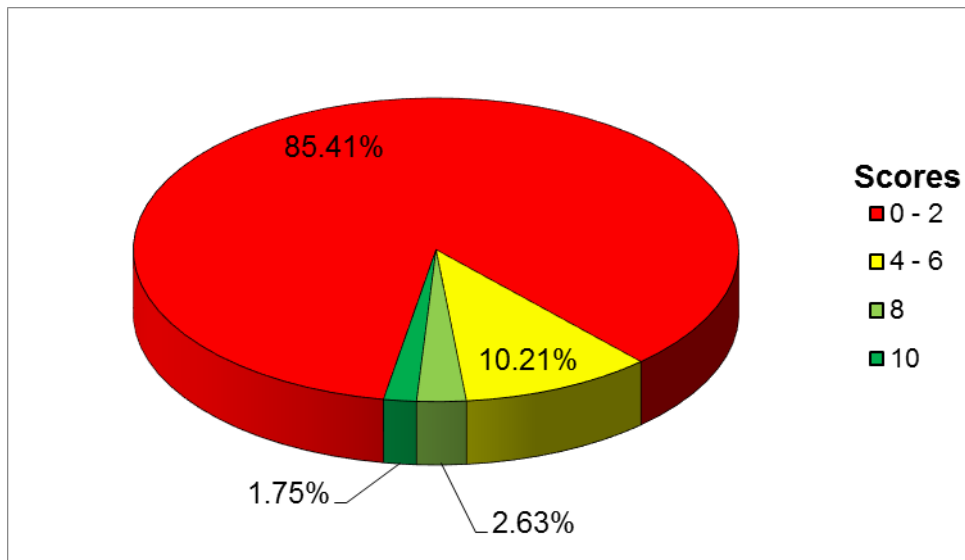


Figure 4: Pupils' Performance on Question 3

Further analysis shows that 68.31 per cent of the pupils who attempted question 3 scored 0 marks. The pupils failed to attempt this question correctly as they lacked skills of applying basic mathematical operations to solve problems related to real life. In part (a), they failed to calculate the difference between the given numbers. For example, some pupils added 39,365 to 33,868 to get 73,233 instead of subtracting 33,868 from 39,365 to get 5,497. Similarly, they failed to subtract the given numbers because the digit in ones, 5, is not sufficient to subtract 6 from it. As a result, they took one tenth from a group of tens but forgot to reduce it from tens after shifting it to the ones place hence ended up with incorrect answers like 6,407 and 5,507. In part (b), they failed to divide 350 mangoes into groups of 10 mangoes. For example, they multiplied 350 mangoes by 10 groups to obtain 3,500 mangoes. Likewise, other pupils subtracted 10 from 350 mangoes to get 340 mangoes. Also, a few pupils added 350 mangoes to 10 to get 360, which was an incorrect answer.

In part (c), the pupils failed to calculate the amount of money that should be paid for 40 days. For example, they divided 4,000 shillings by 40 days and got 100 shillings. Other pupils subtracted 40 days from 4,000 shillings and got 3,960 shillings. In part (d), they failed to calculate the buying price of a radio. For example, several pupils added the selling price and the profit obtained after selling the radio and got 80,500 shillings. In part (e), they failed to calculate the number of weeks in 21 days as they could not understand the requirement of the question. For example, some pupils multiplied 21 days by 7 days of a week and got 147 weeks. Also, others added 21 days and 7 days of a week and got 28 weeks. A sample of an incorrect answer provided by one of the pupils is presented in Extract 3.1.

3. (a)	Find the difference between 39,365 and 33,868.	$\begin{array}{r} 39,365 \\ - 33,868 \\ \hline 7,313 \end{array}$	78123
(b)	Aisha has divided 350 mangoes equally into 10 groups. How many mangoes are there in each group?	$\begin{array}{r} 350 \\ \div 10 \\ \hline 360 \end{array}$	360 mangoes
(c)	Baraka is paid 4,000 shillings per day. If he works for 40 days, how much will he be paid?	$\begin{array}{r} 4,000 \\ \times 40 \\ \hline 4040 \end{array}$	4040

(d)	Joeli bought a radio and sold it for 60,500 shillings. If he got a profit of 20,000 shillings, what was the buying price of the radio?	$\begin{array}{r} 60500 \\ + 20000 \\ \hline 80500 \end{array}$	80500
(e)	A hen incubates its eggs for 21 days. How many weeks are equal to this period?	$\begin{array}{r} 21 \\ \div 21 \\ \hline 22 \end{array}$	22

Extract 3.1: A Sample of an incorrect response to question 3

Extract 3.1 shows that the pupil failed to apply the skills of basic mathematical operations to real-life situations. In part (a), the pupil added the two numbers instead of subtracting, while in part (b), he/she added the number of mangoes and groups, instead of dividing the number of mangoes by the given number of groups. In part (c), the pupil added the amount paid and the number of days instead of multiplying. In part (d), the pupil added the selling price and the profit gained instead of subtracting, and in part (e), the pupil wrote 22 instead of dividing the total number of days by the number of days in a week.

Despite the fact that a large number of pupils failed to answer the question, there were few pupils who answered it correctly as they applied the basic mathematical operations of division, multiplication, addition and subtraction to solve problems in real life. In part (a), they subtracted the small number from the large number correctly and got 5,497. In part (b), they divided 350 mangoes into 10 groups and got

35 mangoes. In part (c), they multiplied 4,000 shillings by 40 days and obtained a total of 160,000 shillings.

In part (d), the pupils subtracted the profit gained of 20,000 shillings from the selling price of 60,500 shillings and got the buying price of the radio, which was 40,500 shillings. Furthermore, in part (e), they divided 21 days by 7 days and got 3 weeks. A sample of a correct response from one of the pupils who attempted the question is shown in Extract 3.2.

3. (a)	Find the difference between 39,365 and 33,868.	<p><u>SOLUTION</u> <u>GIVEN</u> <u>DATA</u></p> $\begin{array}{r} 81215 \\ 39365 \\ -33868 \\ \hline 5497 \end{array}$ <p>= 5497</p>	= 5497
(b)	Aisha has divided 350 mangoes equally into 10 groups. How many mangoes are there in each group?	<p><u>SOLUTION</u> <u>GIVEN</u> <u>DATA</u></p> $\begin{array}{r} 35 \\ 10 \overline{) 350} \\ \underline{-30} \\ 50 \\ \underline{-50} \\ 0 \end{array}$ <p style="text-align: right;">T.M 10 x 3 <u>30</u></p> <p>= 35 groups</p>	= 35 groups
(c)	Baraka is paid 4,000 shillings per day. If he works for 40 days, how much will he be paid?	<p><u>SOLUTION</u> <u>GIVEN</u> <u>DATA</u></p> $\begin{array}{r} 4000 \\ \times 40 \\ \hline 160000 \end{array}$ <p>= 160000 sh</p>	= 160000 sh

(d)	Joeli bought a radio and sold it for 60,500 shillings. If he got a profit of 20,000 shillings, what was the buying price of the radio?	<p style="text-align: center;"><u>SOLUTION</u></p> <p style="text-align: center;"><u>GIVEN</u></p> <p style="text-align: center;"><u>DATA</u></p> $\begin{array}{r} 60500 \\ - 20000 \\ \hline 40500 \end{array} \quad \begin{array}{r} 40500 \\ + 20000 \\ \hline 60500 \end{array}$ <p style="text-align: center;">= 40500sh</p>	= 40500sh
(e)	A hen incubates its eggs for 21 days. How many weeks are equal to this period?	<p style="text-align: center;"><u>SOLUTION</u></p> <p style="text-align: center;"><u>GIVEN</u></p> <p style="text-align: center;"><u>DATA</u></p> $\begin{array}{r} 3 \\ 7 \overline{) 21} \\ - 21 \\ \hline - - \end{array} \quad \begin{array}{r} T.M \\ 7 \\ \times 3 \\ \hline 21 \end{array}$ <p style="text-align: center;">= 3 weeks</p>	= 3 weeks

Extract 3.2: A sample of a correct response to question 3

In Extract 3.2, the pupil correctly answered all parts of the question by demonstrating adequate knowledge and skills on the concept of basic mathematical operations in real-life situations.

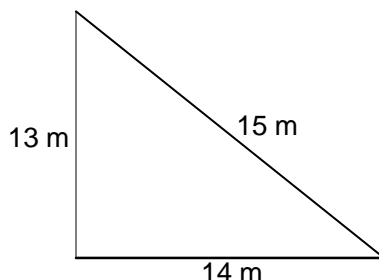
2.4 Question 4: Applying the Concepts of Shapes and Figures to Solve Different Problems

Question 4 had five parts that assessed pupils' competence in applying the concepts of shapes and figures to solve different problems as follows:

- (a) Arrange the lengths of 900 m, 2 cm, 3 km and 400 mm in descending order.
- (b) Which one is longer between 20 centimetres of a wire and 2 metres of a thread?
- (c) How many line segments are there in the following line?



(d) Find the perimeter of the following triangle:



(e) The perimeter of a square is 196 cm. Find the length of one side.

This question assessed pupils' ability to: (a) arrange the measurements of length in the same unit in descending order; (b) identify an object that is longer than the other; (c) identify the number of line segments in the given straight line; (d) calculate the perimeter of a triangle and (e) solve a word problem related to the perimeter of a square.

The statistical analysis shows that a total of 1,591,702 pupils attempted this question. Among them, 1,382,723 (86.87%) pupils scored from 0 to 2 marks, and therefore they had a weak performance. However, 208,979 (13.13%) pupils had a good performance as they scored from 4 to 10 marks. The summary of the pupils' performance is shown in Figure 5.

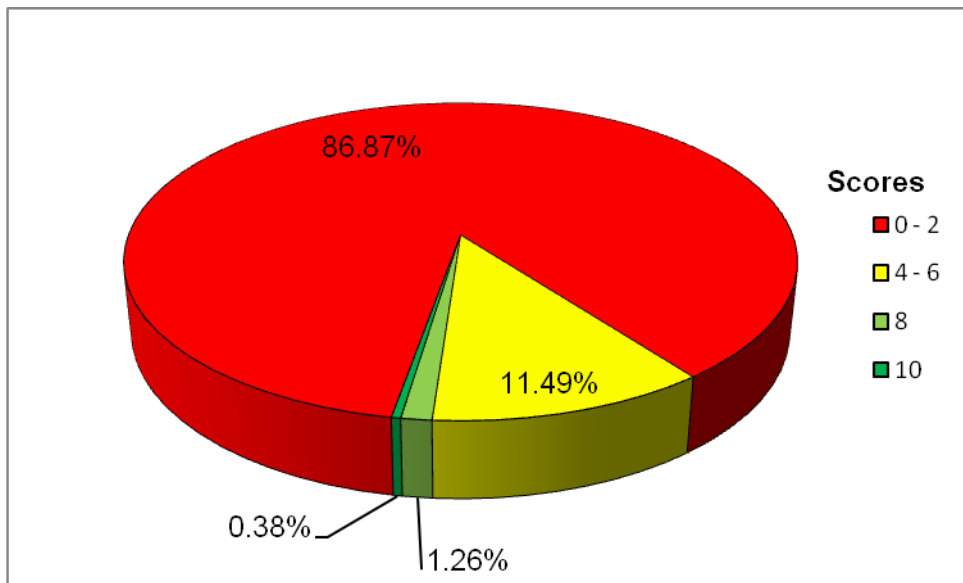
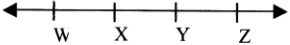
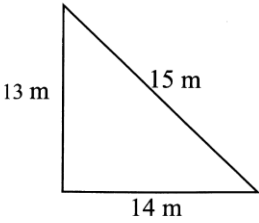


Figure 5: *Pupils' Performance in Question 4*

Further analysis of data shows that 925,007 pupils, equivalent to 58.11 per cent scored 0 marks. In part (a), they failed to rearrange the measurements of length given in different units in descending order. For instance, one of the pupils considered the size of the numbers without taking into consideration their units and hence, they wrote 900 m, 400 mm, 3 km and 2 cm instead of 3 km, 900 m, 400 mm and 2 cm. Similarly, in part (b), most pupils did not consider the units of the given objects. For example, one of the pupils wrote, "A wire of 20 centimetres is longer than a thread of 2 metres".

In part (c), many pupils failed to identify the number of line segments in the given straight line. For example, there were pupils who failed to identify the number of line segments correctly in the straight line as they listed some line segments such as WX, XY, and YZ. Thus, they could not get the other three line segments to get the required six line segments. In part (d), many pupils committed errors in adding the lengths of a triangle. One pupil, for example, did not carry the extra

tenth from ones to the correct place. Thus, the pupil ended up getting a perimeter of 32 m instead of 42 m. In part (e), many pupils could not use the formula for calculating the perimeter of a square correctly to find the length of one side. For example, there were pupils who multiplied the perimeter of the square by the number of sides in the square to get 784 cm instead of dividing the given perimeter by the number of sides to get 49 cm. Extract 4.1 shows part of the pupil's incorrect responses on question 4.

(c)	<p>How many line segments are there in the following line?</p> 	$W + X + Y + Z = 4 \text{ line segments}$	
(d)	<p>Find the perimeter of the following triangle:</p> 	$\text{form} = a + b + c =$ $13\text{m} + 14\text{m} + 15\text{m} = 123\text{m}$	<p>4 line segments</p> <p>123m</p>

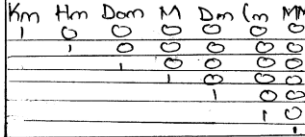
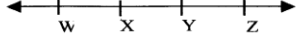
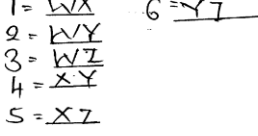
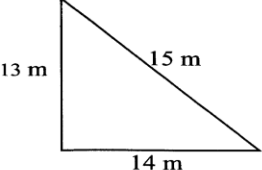
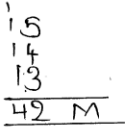
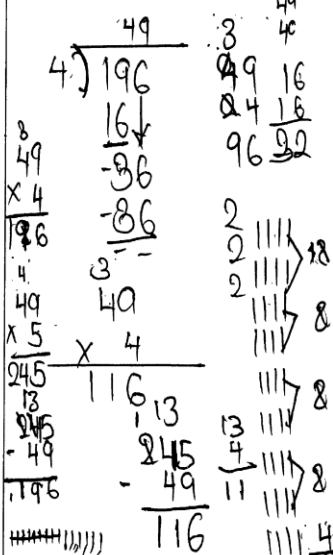
Extract 4.1: A sample of an incorrect response to question 4

In Extract 4.1, the pupil counted the number of letters in a straight line to get the number of line segments in part (c). In part (d), the pupil added the lengths of a triangle incorrectly to get 123 m.

On the other hand, 6,061 pupils, equivalent to 0.38 percent, scored full marks. They either converted the given lengths into kilometres or metres or centimetres or metres in part (a). Then, they rearranged lengths in descending order as 3 km, 900 m, 400 mm, and 2 cm. Similarly, in part (b), they converted 20 centimetres of a wire into 0.2 metre. Then, they compared 0.2 metres of the wire with 2 metres of a thread and concluded that a thread of 2 metres is longer than a wire of 20 centimetres.

In part (c), they were able to identify that WX, WY, WZ, XY, XZ, and YZ were the line segments of the given straight line. As a result, they obtained six line segments in that straight line. In part (d), they used the lengths of a triangle which were 13 m, 14 m and 15 m and the formula, $\text{perimeter} = \text{length} + \text{length} + \text{length}$ to calculate the perimeter of a triangle that has $13\text{m} + 14\text{m} + 15\text{m}$ to get 42 metres. In part (e), they divided the perimeter of 196 centimetres among the four sides of a square and obtained the length of one side equal to 49 centimetres. A sample of a pupil's correct response is shown in Extract 4.2.

4.(a)	Arrange the following lengths in descending order: 900 m, 2 cm, 3 km and 400 mm.	<p>900cm, 2cm, 3km</p> <p>900cm, 2cm, 3km, 400mm</p> <p>3km, 900cm, 400mm, 2cm</p> <table border="1" data-bbox="734 1313 1022 1487"> <thead> <tr> <th>km</th> <th>m</th> <th>cm</th> <th>mm</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>9</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>0</td> <td>4</td> <td>0</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>2</td> </tr> </tbody> </table>	km	m	cm	mm	3	0	0	0	0	9	0	0	0	0	4	0	0	0	0	2	<p>3km, 900cm, 400mm, 2cm</p>
km	m	cm	mm																				
3	0	0	0																				
0	9	0	0																				
0	0	4	0																				
0	0	0	2																				

(b)	Which one is longer between 20 centimetres of a wire and 2 metres of a thread?		2 METRES OF A THREAD
(c)	How many line segments are there in the following line? 		6 LINE SEGMENTS
(d)	Find the perimeter of the following triangle: 		42 M
(e)	The perimeter of a square is 196 cm. Find the length of one side.		49 CM

Extract 4.2: A sample of a correct response to question 4

In Extract 4.2, the pupil showed all procedures used to obtain the correct answers. Also, in some parts, particularly part (e), he/she verified the answers.

2.5 Question 5: Applying Statistical Skills to Present Different Information

Question five had five parts which assessed the pupils' competency to apply the concepts of statistical skills to present different pieces of information. The question was as follows:

The following table shows the number of pupils who completed standard seven at Muungano Primary School in four years:

Year	Number of Pupils
2014	80
2015	90
2016	95
2017	98

- (a) In which year did many pupils complete standard seven?
- (b) What is the total number of pupils who completed standard seven in 2014 and 2015?
- (c) In which year did a least number of pupils complete standard seven?
- (d) Find the difference between the number of pupils who completed in 2014 and 2017.
- (e) How many pupils in total completed standard seven in those four years?

This question assessed the pupils' ability to: (a) identify the year in which many pupils completed standard seven; (b) calculate the total number of pupils who completed standard seven in 2014 and 2015;

(c) identify the year in which the least number of pupils completed standard seven; (d) calculate the difference between the number of pupils who completed in 2014 and 2017 and (e) calculate the total number of pupils who completed standard seven in those four years.

The data analysis on this question shows that 319,623 (20.08%) pupils scored 6 to 10 marks, 460,009 (29.04%) pupils scored 4 to 6 marks and 952,022 (59.81%) pupils scored 2 to 6 marks. Generally, the question had an average performance because 639,680 (40.19%) scored 4 to 10 marks. Figure 6 presents a summary of pupils' performance on question 5.

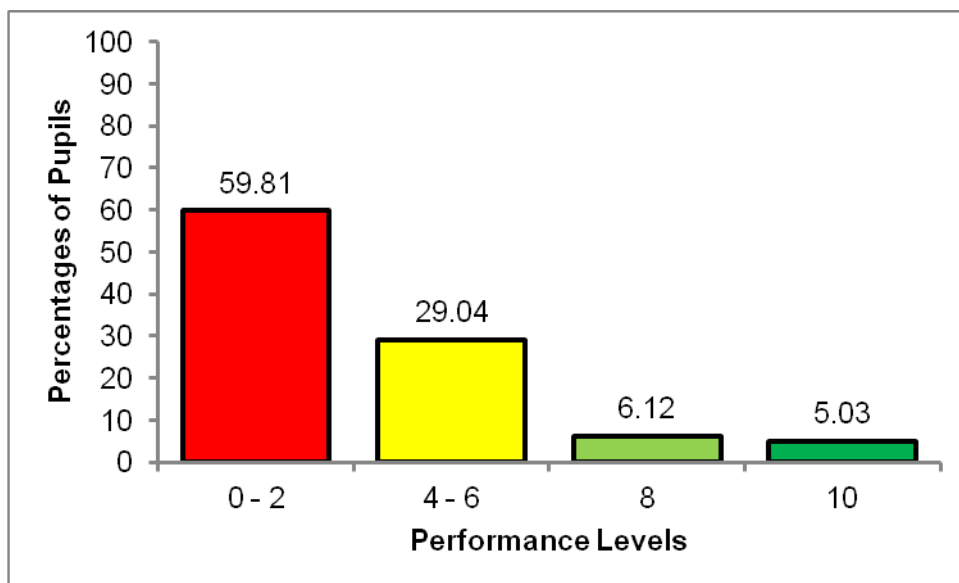


Figure 6: *Pupils' Performance on Question 5*

As it is observed in Figure 6, 5.03 per cent of the pupils who attempted question 5 managed to provide the correct answers. The pupils were competent in applying statistical skills to present different pieces of information. In part (a), they used the given information in the table to identify 2017 as the year in which many pupils completed

standard seven. In part (b), they calculated the total number of pupils who completed in 2014 and 2015 by adding 80 to 90 to get 170 pupils.

In part (c), they identified that 2014 was the year with the least number of pupils. In part (d), they correctly calculated the difference between the number of pupils in 2014 and 2017 by subtracting 80 from 98 to get 18 pupils. In part (e), they added 80, 90, 95 and 98 and got a total of 363 pupils who completed standard seven in four years. Extract 5.1 shows a sample of a correct response from one of the pupils who attempted question 5.

5.	<p>The following table shows the number of pupils who completed standard seven at Muungano Primary School in four years:</p> <table border="1" data-bbox="330 857 718 1060"> <thead> <tr> <th>Year</th> <th>Number of Pupils</th> </tr> </thead> <tbody> <tr> <td>2014</td> <td>80</td> </tr> <tr> <td>2015</td> <td>90</td> </tr> <tr> <td>2016</td> <td>95</td> </tr> <tr> <td>2017</td> <td>98</td> </tr> </tbody> </table> <p>(a) In which year did many pupils complete standard seven?</p>	Year	Number of Pupils	2014	80	2015	90	2016	95	2017	98	<p><u>SOLUTION</u> <u>GIVEN</u> <u>DATA</u></p> <p>= 2017</p>	<p>= 2017</p>
Year	Number of Pupils												
2014	80												
2015	90												
2016	95												
2017	98												

	<p>(b) What is the total number of pupils who completed standard seven in 2014 and 2015?</p>	<p>SOLUTION <u>GIVEN</u> <u>DATA</u></p> $\begin{array}{r} 90 \\ + 80 \\ \hline 170 \end{array}$	
	<p>(c) In which year did a least number of pupils complete standard seven?</p>	<p>SOLUTION <u>GIVEN</u> <u>DATA</u></p> <p>= 2014</p>	<p>= 170 Pupils</p> <p>= 2014</p>

	(d) Find the difference between the number of pupils who completed in 2014 and 2017.	<p style="text-align: center;"><u>SOLUTION</u></p> <p style="text-align: center;"><u>GIVEN</u></p> <p style="text-align: center;"><u>DATA</u></p> $\begin{array}{r} 98 \\ - 80 \\ \hline 18 \end{array}$ <p style="text-align: center;">= 18 pupils</p>	= 18 Pupils
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Extract 5.1: A sample of a correct response to question 5

Extract 5.1 shows that the pupil used statistical knowledge and skills correctly to answer all parts of question 5.

On the other hand, 696,104 (43.7%) pupils scored zero marks. These pupils failed to correctly interpret the information given in the table due to the following reasons: In part (a), most of them wrote the number of pupils which was 98 instead of writing 2017 which was the year in which many pupils completed standard seven. In part (b), they added 2014 to 2017 to get 4029 instead of adding the number of pupils who completed standard seven in 2014 and 2015 to get 170. Others subtracted 2014 from 2015 to get 1 and a few multiplied 80 by 90 and got 7,200.

In part (c), they wrote 80 which was the number of pupils instead of identifying 2014 as the year in which the least number of pupils completed Standard seven. In part (d), they added 80 to 98 and got 178 instead of calculating the difference between the number of pupils who completed in 2014 and 2017. In addition, others subtracted 2014 from 2017 and got 3. In part (e), most of them calculated the sum of

2014, 2015, 2016 and 2017 and got 8,062 instead of adding the number of pupils in each year to get 363. Extract 5.2 shows a sample of an incorrect answer from one of the pupils who attempted this question.

No	Question	Working Space	Answer
	(d) Find the difference between the number of pupils who completed in 2014 and 2017.	<p>The difference of 2014 and 2017 is</p> <p>2014 pupils who complete standard seven were 80 and pupils who complete standard seven were 98</p>	<p>2014 the Pupils who complete standard seven were 80 and Pupils who complete standard seven were 98</p>
	(e) How many pupils in total completed standard seven in those four years?	$ \begin{array}{r} 2014 \\ 2015 \\ + 2016 \\ 2017 \\ \hline 8062 \end{array} $	<p>8062</p>

Extract 5.2: A sample of an incorrect response to question 5

In Extract 5.2, the pupil wrote the number of pupils who completed in 2014 and 2017 in part (d) but did not proceed further to calculate the

difference in the number of pupils. In part (e), the pupil calculated the sum of four years to get 8062 instead of finding the total number of pupils who completed standard seven in those four years to get 363.

3.0 ANALYSIS OF PUPILS' PERFORMANCE IN EACH COMPETENCE

The mathematics assessment paper had five (5) questions that assessed the specific competency in *Applying the Concepts of Numbers to Communicate in Different Contexts*, *Applying the Concepts of Patterns to Solve Problems in Everyday Life*, *Applying Mathematical Operations to Solve Problems*, *Applying the Concepts of Shapes and Figures to Solve Different Problems* and *Applying Statistical Skills to Present Different Information*.

The analysis of data shows that four (04) competencies had weak performance and one (01) competence of the Application of Statistical Skills to Present Different Information that had an average performance. In addition, the comparison of performance in each specific competency in SFNA 2022 and 2021 shows that the performance of pupils in the Application of Statistical Skills to Present Different Information has increased by 36.75 percent. However, the performance of pupils in Applying the Concepts of Patterns to Solve Problems in Everyday Life, Applying the Concepts of Numbers to Communicate in Different Contexts, Applying Mathematical Operations to Solve Problems and Applying the Concepts of Shapes and Figures to Solve Different Problems has dropped by 24.90 percent, 39.79 percent, 19.04 percent and 30.61 percent respectively. (See Appendices A and B)

4.0 CONCLUSION

The analysis of the assessment results in the mathematics subject shows that in 2022, a total of 790,883 (49.70%) pupils passed with grades A to D. Moreover, the overall performances in the assessed main competencies are as follows: Using Mathematical Language to Present Ideas or Arguments in Real Life Contexts (43.73%), Applying Skills of Reasoning and Proof in Real-life Contexts (62.84%), and Using Mathematics to Solve Problems in Different Contexts (72.90%). However, the analysis of the pupils' performance in each specific competency shows that the specific competency on the Application of Statistical Skills to Present Different Information (40.19%) was averagely performed. The remaining specific competencies were poorly performed as follows: Applying the Concepts of Patterns to Solve Problems in Everyday Life (23.94%), Applying the Concepts of Numbers to Communicate in Different Contexts (17.16%), Applying Mathematical Operations to Solve Problems (14.59%) and Applying the Concepts of Shapes and Figures to Solve Different Problems (13.13%).

The weak performance in the assessed competencies was due to pupils' failure to apply different mathematical formulae, use information from drawings and tables, use the Reading, Writing and Arithmetic (3R's) skills and perform mathematical operations in answering the assessment questions.

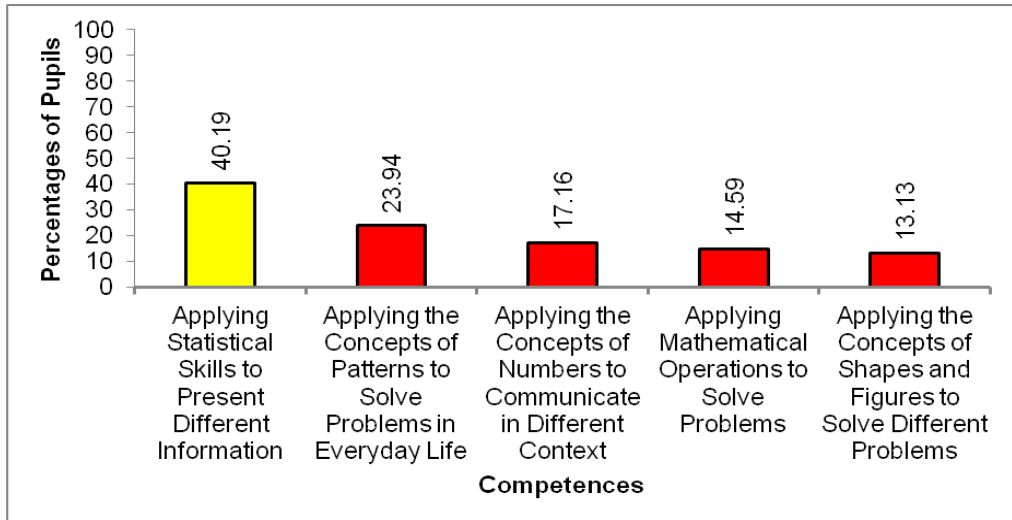
5.0 RECOMMENDATIONS

In order to improve the performance of the Standard Four Pupils in the specific competencies which were poorly performed, the following are recommended:

- (a) Teachers should use teaching and learning aids related to *Mathematical Operations to Solve Problems* so as to enable pupils to identify the place values of Arabic numbers and Roman numbers.
- (b) Teachers should guide pupils to interpret statistical data and present information using a table. Also, they should use participatory methods such as group discussions to solve word problems related to the perimeter of different figures such as triangles and squares.
- (c) Teachers should provide pupils with various questions on the application of mathematical formulae so as to enable pupils to remember and use them in answering the assessment questions.

Appendix A: Summary of performance in each competence in SFNA

2022



**Appendix B: Comparison of performance in each competence in
SFNA 2022 and SFNA 2021**

