



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



**PUPILS' ITEM RESPONSE ANALYSIS REPORT FOR
STANDARD FOUR NATIONAL ASSESSMENT
(SFNA) 2021**

MATHEMATICS



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04 MATHEMATICS

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FOREWORD

The Pupils' Response Analysis Report on Standard Four National Assessment (SFNA) for the year 2021 has been prepared for the purpose of giving feedback to pupils, teachers, curriculum developers, policymakers, and other education stakeholders on how the pupils answered the assessment questions.

The analysis shows that the pupils' performance in the 2021 Mathematics assessment was good as 69.41 per cent of 1,560,693 pupils passed. In this report, issues that influenced the pupils' performance in each item have been presented. The pupils who performed well managed to answer two to five parts correctly in the assessed competencies.

However, there were few pupils (30.59%) with weak performance. The performance was weak because the pupils failed to: identify the requirements of the question; perform mathematical operations on measurements of time as well as using incorrect formulae in answering questions on shapes and figures.

The analysis of pupils' performance in each competence was done and indicated that pupils had an average performance in *Applying the Concepts of Numbers to Communicate Ideas and Concepts in Different Contexts*, *Applying the Concepts of Patterns to Solve Real Life Problems* and *Applying the Concepts of Shapes and Figures to Solve Different Problems*. On the other hand, the competency of *Applying Statistical Skills to Present Different Information* as well as *Applying Measurements in Different Life Contexts* had a weak performance.

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

The National Examinations Council of Tanzania believes that the feedback provided in this report will enable the education stakeholders to improve the pupils' competencies in Mathematics subject in future assessments.

The National Examinations Council of Tanzania would like to acknowledge all examination officers and other stakeholders who took part in preparing this report.



Dr. Charles E. Msonde

EXECUTIVE SECRETARY

1.0 INTRODUCTION

The National Assessment of Standard Four Pupils in Mathematics subject was held on 28th and 29th October 2021. A total of 1,681,769 pupils were registered. Out of those 1,560,693 pupils, equivalent to 92.8 per cent sat for the assessment in Mathematics subject.

The analysis of the assessment results for 2021 in the Mathematics subject shows that 1,083,166 pupils, equivalent to 69.41 per cent, passed. In 2020, a total of 1,703,037 pupils, equivalent to 93.15 per cent, were assessed, and out of those 1,206,531 pupils, equivalent to 70.85 per cent, passed. This represents a drop of 1.44 per cent in the pupils' performance. The comparison of pupils' performance in 2020 and 2021 in each grade is shown in Figure 1.

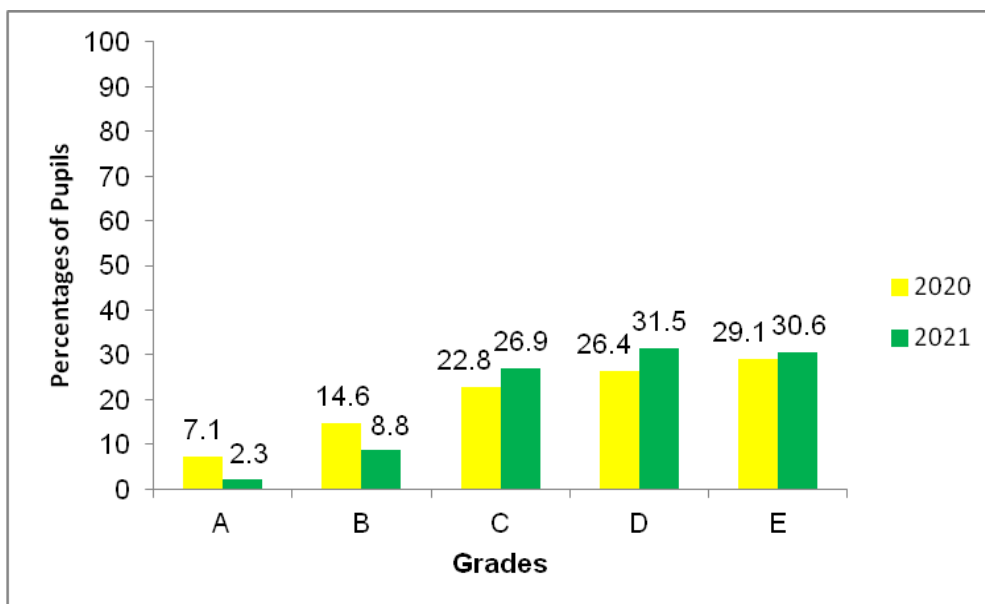


Figure 1: Comparison of pupils' grades in 2020 and 2021

The Mathematics Assessment paper consisted of five (5) questions. Each question had parts (a), (b), (c), (d) and (e). The correct answer in each part was awarded two (2) marks. So, each question weighed ten (10) marks making a total of 50 marks for the whole paper.

The pupils' responses to each question are analyzed to identify the reasons that made them pass or fail. Samples of extracts from some

of the pupils 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 "*very good performance*", 8 marks "*good performance*", from 4 to 6 marks "*average performance*" and from 0 to 2 marks "*weak performance*". On the other hand, the standards of performance by competencies were done based on the percentage of pupils who passed in each competence whereby; 67 – 100 indicates very good performance, 34 – 66 average performance, and 0 – 33 for weak performance.

2.0 ANALYSIS OF PUPILS' RESPONSES FOR EACH QUESTION

In this report, statistics of the pupils' performance in each question have been presented by using charts or tables and four colours have been used to differentiate the pupils' performance in each question. The four colours are green, light green, yellow and red colour, and they represent *very good*, *good*, *average* and *weak performance* respectively.

Generally, the analysis of pupils' responses revealed average performance in questions 1, 2 and 4 and weak in questions 3 and 5. In this section, every question has been analysed and pupils' performances have been shown. Extracts have been used to authenticate the explanations raised for each question.

2.1 Question 1: Applying the Concepts of Numbers to Communicate Ideas and Concepts 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. The question was as follow:

- (a) Write the place value of the fourth digit observed from right to left of 49,051;
- (b) Write 32 in Roman numbers;

- (c) Write 76,502 in long form;
- (d) Write the following number in short form:
 $2000 + 900 + 70 + 5$; and
- (e) Write 435 in words.

In this question, part (a) assessed the pupils' ability to identify the place value of the digit in a number, part (b) assessed the pupils' ability to read Arabic numbers and write them in Roman Numbers. Moreover, part (c) assessed the pupils' ability to write numbers in long form, part (d) assessed the pupils' ability to write numbers in short form, and part (e) assessed the pupils' ability to write Arabic numbers in words.

The analysis shows that the pupils' performance in this question was average because a total of 888,838 pupils, equivalent to 56.95 per cent, scored from 4 to 10 marks. Among them, 474,865 pupils equivalent to 30.43 per cent scored marks ranging from 4 to 6 and 413,973 pupils equivalent to 26.53 per cent scored from 8 to 10 marks. However, 671,890 pupils equivalent to 43.05 per cent had poor performance because they scored from 0 to 2 marks. The summary of the pupils' performance in this question is shown in Figure 2.

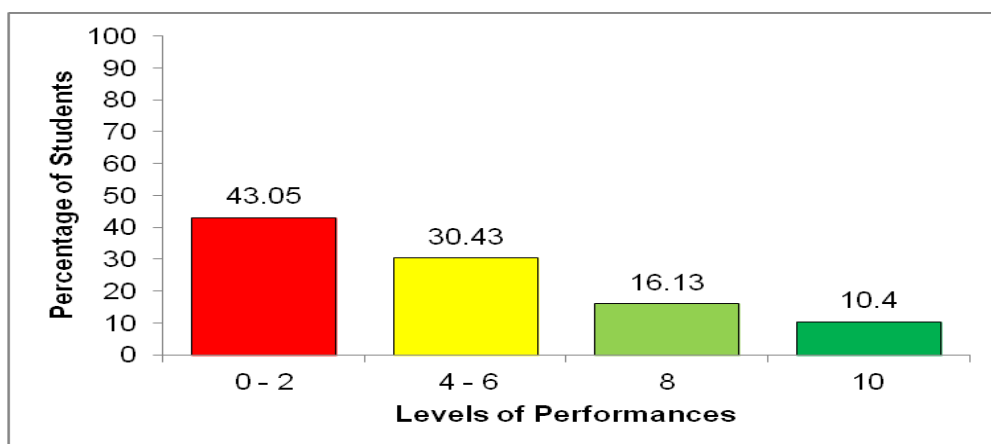


Figure 2: *Pupils' Performance in Question 1*

As shown in Figure 2, 10.40 per cent of the pupils scored all marks in question 1. In part (a), these pupils were able to write the place value

of the fourth digit observed from right to left of the number 49051 which is thousands. In part (b), they were able to write the number 32 in Roman number by writing XXXII as the correct answer. In part (c), they were able to write 76,502 in its long-form as $70000 + 6000 + 500 + 00 + 2$. In part (d), they were able to write $2000 + 900 + 70 + 5$ in short form as 2975. In part (e), they were able to correctly write 435 in words as four hundred and thirty five. Extract 1.1 shows the sample of the correct answer from one of the pupils who correctly answered question 1.

No	Question	Working Space	Answer
1. (a)	Write the place value of the forth digit observed from right to left of the number 49051.		Thousands
(b)	Write the number 32 in Roman numbers.	$32 = \underline{\underline{XXXII}}$	XXXII
(c)	Write the number 76502 in long form.	$76502 = 70000 + 6000 + 500 + 00 + 2$	$70,000 + 6000 + 500 + 00 + 2$
(d)	Write the following number in short form: $2000 + 900 + 70 + 5$	$ \begin{array}{r} 2000 \\ 900 \\ 70 \\ + 5 \\ \hline 2975 \end{array} = 2975 $	2,975.
(e)	Write the number 435 in words.	Four hundred and thirty five	Four hundred and thirty five.

Extract 1.1: Sample of the pupil's correct answer for question 1.

Extract 1.1 shows that the pupil wrote the correct answers in all parts of the question. He/she correctly showed the procedures to arrive at the correct response.

However, a total of 428,769 (27.5%) pupils scored 0. The analysis of the pupils' responses shows that these pupils were unable to answer part (a) correctly because they failed to recognize the fourth digit from the right to left of 49,051. For example, one of the pupils defined the place value of the fifth digit as ten thousand instead of the place value of the fourth digit. Another pupil added the numbers which were not in the question that is $(4905 + 32)$. There was also another pupil who wrote the place value of the digit as 9000 instead of thousands.

In part (b), the pupils were unable to write 32 in Roman numbers. This was due to a lack of knowledge of the basic Roman numbers, i.e. I, V, X and L which are used to form other Roman numbers from I to L. They also failed to understand that in writing Roman numbers, the same number cannot be repeated in succession more than three times. For example, one of the pupils wrote IIII instead of XXXII. Another pupil copied 32 as it is written in the question paper instead of changing 32 into Roman numbers as XXXII.

In part (c), the pupils were unable to write 76,502 in long-form due to a lack of skills in writing whole numbers in their place values. For example, one of the pupils wrote 76,502 in words as seventy thousand, six thousand, five hundred, zero, two instead of $70000 + 6000 + 500 + 0 + 2$. Other pupils added the digits in 76502 such as $7 + 6 + 5 + 0 + 2$ to get 20 contrary to the requirements of the question.

In part (d), some pupils lacked the skills of writing the number $2000 + 900 + 70 + 5$ in short form. For example, one pupil treated all digits in the given number as if they were in the thousands place and wrote the short form of a given number as 20000. Another pupil wrote these numbers in words separately as two thousand, nine hundred, seventy and five.

In part (e), the pupils failed to write 435 in words because they lacked skills in reading and writing. For example, one of the pupils copied the question as it appears on the question paper. Other pupils failed to identify the place value of each digit in 435. For instance, one pupil

wrote 435 in words as four thousand three hundred and five. Another pupil wrote the digits in 435 as four, three, five contrary to the requirements of the question. A sample showing the pupil's incorrect responses in question 1 is presented in Extract 1.2.

No	Question	Working Space	Answer
1. (a)	Write the place value of the forth digit observed from right to left of the number 49051.		9000
(b)	Write the number 32 in Roman numbers.	XXIII	XXII
(c)	Write the number 76502 in long form.	76502	76502
(d)	Write the following number in short form: $2000 + 900 + 70 + 5$	$2000 + 900 + 70 + 5$	
(e)	Write the number 435 in words.	four thirty five	

Extract 1.2: A sample of a pupil's incorrect response to question 1.

In Extract 1.2, the pupil wrote 9000 instead of thousand in part (a). In part (b), the pupil presented 32 as XXIII instead of XXXII. In parts (c), (d) and (e), the pupil wrote answers that were not related to the demands of the question indicating a lack of knowledge on whole numbers.

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

This question had five parts which assessed the pupils' competences in applying number patterns to identify the missing numbers. The question was;

- (a) fill in the missing number in the following sequence: 50, 40, 30, __, 10;
- (b) Arrange the following numbers starting from the largest to the smallest: 23, 64, 32, 46, 29, 38, 54;
- (c) Write the next Roman numbers in the following pattern V, XVI, XXVII, XXXVIII, ____;
- (d) Find the height of Rose given that the heights of Mrisho, Samwel and Rose are 112 cm, 124 cm and 136 cm respectively, and that Rose is the tallest and;
- (e) Find the fifth number in the pattern given that Kadeu added 5 to the first number (20).

In this question; part (a) assessed the pupils' ability to identify the sequence of numbers decreasing by ten from one number to another, part (b) assessed the pupils' ability to arrange the sequence of numbers in descending order and part (c) assessed the pupils' ability to identify the missing number in the sequence of the Roman numbers. Moreover, part (d) assessed the pupils' understanding in solving word problems on sequence of numbers. Similarly, part (e) assessed the pupils' ability in solving word problems on sequence of numbers.

The analysis of data shows that 25,806 (1.65%) pupils scored 10 marks. Also, 63,533 (4.07%) pupils scored 8 marks. In addition, 672,663 (43.12 %) pupils scored from 4 to 6 marks. On the other hand, 798,396 (51.16%) pupils had a weak performance because they scored 0 to 2 marks. Generally, this question had an average performance because 762,332 (48.8%) pupils scored 4 to 10 marks.

The summary of the pupils' performance in this question is shown in Figure 3.

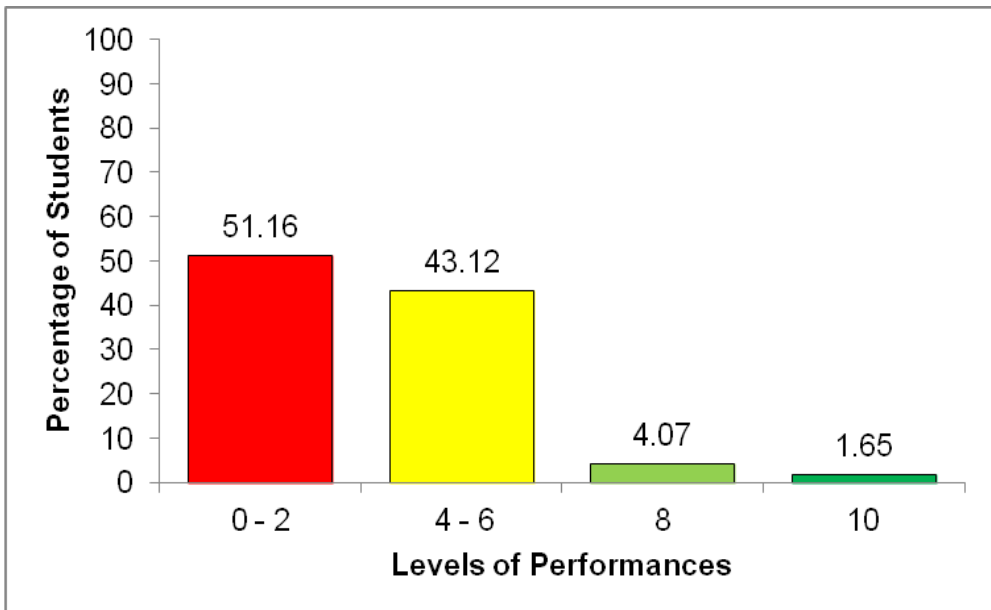


Figure 3: *The Pupils' Performance in Question 2*

The data analysis shows that 762,332 pupils equivalent to 48.84 per cent scored 4 to 10 marks because they were able to answer two parts out of five. In part (a), pupils were able to write 20 which was the missing number in the given sequence. In part (b), the pupils were able to arrange the mixed numbers starting from the largest to the smallest to get the sequence 64, 54, 46, 38, 32, 29, 23. In part (c), they were able to identify that the given Roman numbers differ by 11. Hence, they correctly wrote XLIX as the next number in the given pattern. Similarly, in part (d), the pupils managed to add 12 to the height of Zalia and found that Rose is 148 cm high. Likewise, in part (e), the pupils were able to apply 5 and the first number which is 20 to create the sequence 20, 25, 30, 35, 40. Then from this pattern, they were able to identify the fifth number as 40. The sample response of a pupil who answered question 2 correctly is shown in Extract 2.1.

No	Question	Working Space	Answer
2. (a)	Fill the missing number in the following sequence: 50, 40, 30, _____, 10.	50, 40, 30, 20, 10	20
(b)	Arrange the following numbers starting from the largest to the smallest: 23, 64, 32, 46, 29, 38, 54.	64, 54, 46, 33, 32, 29, 23	64, 54, 46, 38, 32, 29, 23
(c)	Write the next Roman number in the following pattern: V, XVI, XXVII, XXXVIII, _____.	V, XVI, XXVII, XXXV, XLIX	XLIX
(d)	The heights of Mrisho, Samweli, Zalia na Rose are in sequence which increases by 12 cm. Mrisho has a height of 112 cm, Samweli 124 cm and Zalia 136 cm. If Rose is the tallest, what is her height in centimetres?	$ \begin{array}{r} 112 \\ + 12 \\ \hline 124 \\ + 12 \\ \hline 136 \\ + 12 \\ \hline 148 \end{array} $	148 cm
(e)	Kadeu thought of a number. He obtained the next number by adding 5 to the previous number. If the first number he thought is 20, what will be the fifth number in that pattern?	20, 25, 30, 35, 40	40

Extract 2.1: A sample of response from a pupil who answered this question correctly.

In extract 2.1, the pupil gave correct answers in all parts while showing all the required procedures.

On the other hand, a total of 798,396 (43.05%) pupils performed poorly as they scored marks ranging from 0 to 2. In part (a), these pupils failed to identify that the common difference of the number in the given sequence is 10. Thus, the missing number is 20. For example, one pupil wrote 70, another pupil wrote 50 and another pupil wrote 90. In parts (b), these pupils could not arrange the given numbers in descending order. For example, one pupil arranged the number in an incomprehensible sequence to get the sequence 23, 20, 32, 38, 46, 54, 64. Another pupil summed the given numbers to get 286 contrary to the requirements of the question. In part (c), the pupils

failed to identify the missing number in the sequence of Roman numbers. For example some pupils presented the next number in Arabic numerals as 49, contrary to the requirements of the question. In part (d), the pupils could not add 12 to the height of Zalia to get the Rose's height. In part (e), the pupils failed to use the common difference (5) together with the first number (20) to find the fifth number. For example, one pupil added 5 to 20 to get 25. Another pupil multiplied 20 by 5 to get 100. Another pupil divided 20 by 5 to get 4. Extract 2.2 shows a sample of incorrect answers provided by one of the pupils.

No	Question	Working Space	Answer
2. (a)	Arrange the following numbers in the sequence starting from the largest to the smallest. 125, 78, 111, 89, 305, 32, 120.	111, 89, 78, 32 305, 125, 120,	= 32
(b)	Write the missing number in the following sequence: 36, 33, 30, __, 24.	<u>FIND THE DIFFERENCE</u> $36 - 33 = 03$ 36, 33, 30, <u>23</u> , 24 $30 - 3 = 23$	= 23
(c)	Write the next two numbers in the following sequence: X, XV, XX, XXV, __, __.	10, 15, 20, 25, <u>30</u> , <u>35</u> $+5$ $+5$ $+5$ $+5$ $+5$	= 30 and 35
(d)	Four trees differ in length according to the following sequence: 5m, 8m, 11m, 14m. What will be the length of the fifth tree in the same pattern?	15 11 4 8 5 $+4$ 62	= 62
(e)	Agnes counted numbers by reducing ten to get the next number. If the first number was 80, find the sixth number.	$\frac{200}{10} = 20$	= 20

Extract 2.2: A sample of incorrect response in question 2.

Extract 2.2 shows a sample of responses from a pupil who supplied incorrect answers to all five parts of this question.

2.3 Question 3: Applying Measurements in Different Life Contexts

This question had five parts that assessed the competence of pupils in applying the concepts of numbers to communicate in different contexts. The question was as follow:

(a) Add;

Hours	minutes
14	30
+8	40
<hr/>	
<hr/>	

(b) Azimio primary school has 340 boys and 318 girls. How many pupils are there?

(c) Subtract;

Hours	minutes
6	45
-4	50
<hr/>	
<hr/>	

(d) Bahati walked from home to the market for two hours. Bahati walked for how many minutes?

(e) Ronaldo played a football match for 40 minutes in a match of 90 minutes. How many minutes didn't he play?

In this question; part (a) assessed the pupils' ability to add hours and minutes based on the fact that 1 hour equals to 60 minutes, part (b) assessed the pupil's ability to solve word problems, part (c) assessed the pupils' ability to subtract hours and minutes considering that 1 hour equals to 60 minutes, part (d) assessed the pupils' ability to convert hours into minutes and part (e) assessed pupils' ability to find the difference between the given minutes.

The analysis of the data shows that, a total of 1,560,728 attempted this question. Among them, 37,932 (2.43%) pupils scored 10 marks, 63,449 (4.07%) pupils scored 8 marks, 423,422 (27.13%) pupils scored from 4 to 6, and 1,035,925 (66.37%) scored from 0 to 2 marks.

Generally, the pupils' performance on this question was weak. The percentage of the pupils' performance is shown in Figure 4.

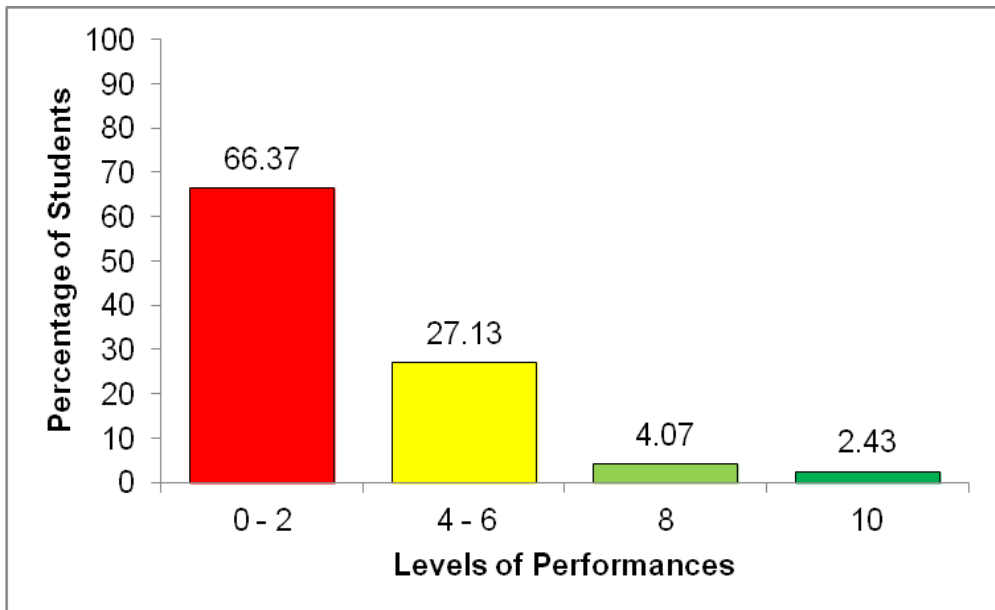


Figure 4: *Pupils' Performance in Question 3*

Figure 4 shows that most of the pupils (66.37%) scored 0 to 2 marks, and among them, 35.8 percent scored 0. In part (a), these pupils could not carry an extra hour that exceeded the minute's column to the hour column. Examples of the noted incorrect responses include 22 hours 70 minutes, and 22 hours 10 minutes instead of 23 hours 10 minutes. In part (b), the pupils failed to add numbers with three digits each. Thus, they wrote incorrect answers such as 650 and 740 instead of 658. Other pupils failed to comprehend words used in the given word problem into addition operation as they subtracted 318 from 340 to get 22 instead of 658. In part (c), the pupils failed to subtract the given hours and minutes by taking 1 hour from the hour column to the minute column. Thus, they produced incorrect answers such as 2 hours 55 minutes and 1 hour 05 minutes instead of 1 hour 55 minutes. Other pupils added the minutes and hours to get either 10 hours 95 minutes or 11 hours 35 minutes contrary to the requirements of the question. In part (d), the pupils failed to convert minutes into hours. For example, one pupil wrote that 2 hours is equal to 60 minutes instead of 120 minutes. In part (e), some pupils added 40 minutes to 50 minutes to get 90 minutes instead of subtracting 40

minutes from 90 minutes to get 50 minutes. Extract 3.1 shows sample answers from a pupil who failed to respond to this question correctly.

3. (a)	Add; <table><tr><td>Hours</td><td>minutes</td></tr><tr><td>14</td><td>30</td></tr><tr><td>+ 8</td><td>40</td></tr><tr><td colspan="2"><hr/></td></tr></table>	Hours	minutes	14	30	+ 8	40	<hr/>		<table><tr><td>Hours</td><td>Minutes</td></tr><tr><td>14</td><td>30</td></tr><tr><td>+ 8</td><td>40</td></tr><tr><td colspan="2"><hr/></td></tr><tr><td>28 hrs</td><td>8 min</td></tr></table>	Hours	Minutes	14	30	+ 8	40	<hr/>		28 hrs	8 min	28 hrs 8 minutes
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(b)	Azimio primary school has 340 boys and 318 girls. How many pupils are there?	<table><tr><td>340</td></tr><tr><td>+ 318</td></tr><tr><td><hr/></td></tr><tr><td>748</td></tr></table>	340	+ 318	<hr/>	748	748														
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(d)	Bahati walked from home to the market for two hours. Bahati walked for how many minutes?	two																			
(e)	Ronaldo played a football match for 40 minutes in a match of 90 minutes. How many minutes didn't he play?	<table><tr><td>hour</td><td>min</td></tr><tr><td>4</td><td>0</td></tr><tr><td>- 9</td><td>0</td></tr><tr><td colspan="2"><hr/></td></tr><tr><td>30</td><td>0</td></tr></table>	hour	min	4	0	- 9	0	<hr/>		30	0	<u>300</u>								
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Extract 3.1: A sample of an incorrect response to question 3.

In Extract 3.1, the pupils wrote incorrect answers to all parts of this question, indicating a lack of knowledge and skills on the concept of measurement of time.

Despite the poor performance in this question, 37,659 (2.4%) pupils managed to give the correct answers in all parts. In part (a), the pupils were able to add the given hours and minutes by carrying an extra hour from the minute side to the hour side in order to get 23 hours and 10 minutes, which was the correct answer. In part (b), they were able to add the number of boys and girls in the school and got 658 as the total number of pupils in the school. In part (c), the pupils managed to

subtract the given hours and minutes by taking one hour from the hour side to the minute side in order to get 1 hour and 55 minutes. In part (d), the pupils managed to convert 2 hours into minutes and got 120 minutes, keeping in mind that 1 hour is equal to 60 minutes. In part (e), the pupils were able to subtract 40 minutes from 90 to get 50 minutes. A sample of correct responses from one of these pupils is shown in Extract 3.2.

3. (a)	Add; <table><tr><td>Hours</td><td>minutes</td></tr><tr><td>14</td><td>30</td></tr><tr><td>+ 8</td><td>40</td></tr><tr><td colspan="2"><hr/></td></tr></table>	Hours	minutes	14	30	+ 8	40	<hr/>		<table><tr><td>Hours</td><td>Minutes</td></tr><tr><td>14</td><td>30</td></tr><tr><td>8</td><td>40</td></tr><tr><td colspan="2"><hr/></td></tr><tr><td>22</td><td>10</td></tr><tr><td>- 1</td><td>60</td></tr><tr><td colspan="2"><hr/></td></tr><tr><td>23</td><td>10</td></tr></table>	Hours	Minutes	14	30	8	40	<hr/>		22	10	- 1	60	<hr/>		23	10	Hours minutes 23 10
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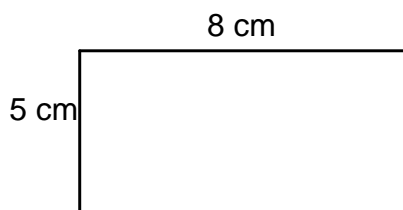
Extract 3.2: A sample answer of a pupil who answered this question correctly.

In Extract 3.2, the pupil correctly answered all parts of this question. He/she correctly showed the procedures to arrive at the correct answer.

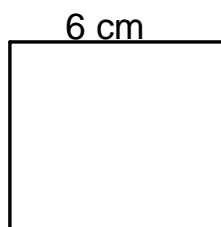
2.4 Question 4: Applying the Concepts of Shapes and Figures to Solve Different Problems

Question 4 had five parts that assessed the pupils' skills in applying the concept of shapes and figures to solve different problems. The question was as follows:

- (a) Draw an equilateral triangle.
- (b) find the perimeter of the following figure:



- (c) The perimeter is 57 cm. If all sides are equal, find the length of one side.
- (d) Find the perimeter of the following square:



- (e) The perimeter of a triangle is 45 cm. If one side is 12 cm long, second side is 15 cm, find the length of the third side.

Part (a) assessed pupils' ability to draw an equilateral triangle based on the fact that all sides of this triangle have the same lengths. Part (b) assessed the pupils' skills in finding the perimeter of a rectangle. Part (c) assessed the skills of pupils in finding the length of an equilateral triangle given its perimeter. Part (d) assessed the pupils'

ability in finding the perimeter of a square. Part (e) assessed the pupils' skills in finding the missing length of a scalene triangle.

The analysis of the data shows that a total of 1,560,728 pupils attempted this question. Among them, 35,244 (2.26%) pupils scored 10 marks, 73,492 (4.71%) pupils scored 8 marks, 573,989 (36.78%) pupils scored from 4 to 6, and 878,003 (56.26%) pupils had weak performance as they scored from 0 to 2. Generally, the pupils' performance in this question was average because the percentage of pupils who scored from 4 to 10 marks was 43.75. The percentage of the pupils' performance is shown in Figure 5.

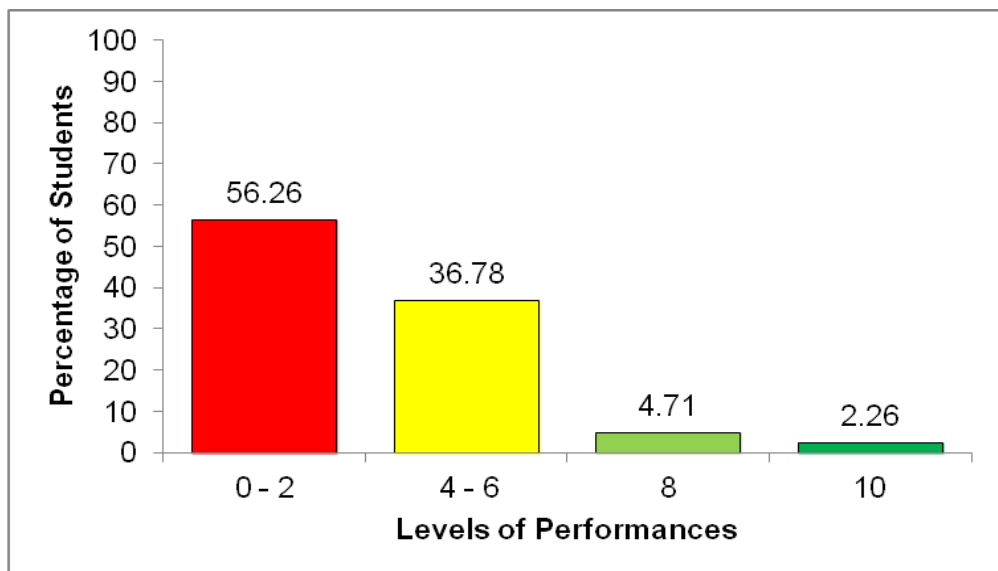
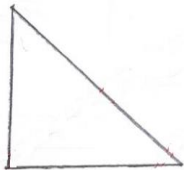
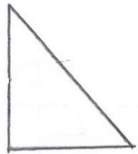
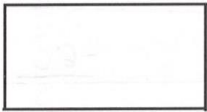
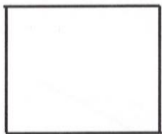


Figure 5: *Pupils' Performance in Question 4*

The analysis of the data shows that 37,885 (24.3%) pupils scored 0. In part (a), the pupils lacked an understanding of types of two-dimensional figures as they drew various figures that were contrary to the requirements of the question. For instance, several pupils sketched quadrilaterals and isosceles triangles instead of equilateral triangles. In part (b), the pupils applied incorrect formula to find the perimeter of a rectangle. Thus, they produced incorrect responses such as 1313, 143, 58, 40, and 13, instead of 26 cm. In part (c), the

pupils did not understand that all sides of an equilateral triangle are equal, as they were supposed to divide 57 by 3 to get 19 cm. Most of them presented incorrect responses, like 57 cm and 171 cm. In part (d), the pupils applied incorrect formulae to find the perimeter of a square and some of them wrote incorrect responses, such as 6 cm, 12 cm, and 36 cm instead of 24 cm. In part (e), the pupils could not relate the perimeter of a triangle with its sides. Hence, failed to correctly find the length of the third side in a triangle. For instance, some pupils added all the given numbers in the question to get 72 cm instead of subtracting 12 and 15 from 45 to get the length of the third side, which is 18 cm. A sample of incorrect responses from one of the pupils is shown in Extract 4.1.

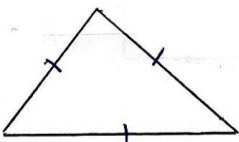
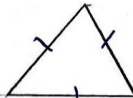
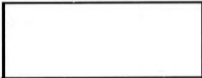
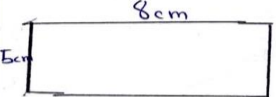
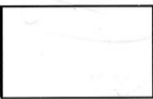
4. (a)	Draw an equilateral triangle.		
(b)	Find the perimeter of the following figure: 8 cm 5 cm 	8 $P = L + W + L + W$ $P = 8\text{ cm} + 5\text{ cm} = 13\text{ cm}$	<u>13 cm.</u>

(c)	The perimeter of the triangle is 57 cm. If all sides are equal, find the length of one side.	$P = a + b + c$ $P = 57\text{cm} + 57\text{cm} + 57\text{cm}$ $+ 57\text{cm} = \underline{228\text{cm}}$ 228cm	<u>228cm</u>
(d)	Find the perimeter of the following square: 6 cm 	$P = L \times 4$ $P = 6\text{cm} + 6\text{cm} = \underline{12\text{cm}}$	<u>12cm</u>
(e)	The perimeter of a triangle is 45 cm. If one side is 12 cm long, second side 15 cm, find the length of the third side.	$P = a + b + c$ $45 \times 12 \times 15 = 72\text{cm}$ $\begin{array}{r} 45 \\ + 12 \\ \hline 15 \\ \hline 72 \end{array}$	<u>72cm</u>

Extract 4.1: A sample of incorrect response to question 4 from one of these pupils.

In Extract 4.1, the pupil drew a right angled triangle instead of an equilateral triangle in part (a). In part (b), the pupil added 5 cm to 8 cm to get 13 cm instead of adding all the lengths in the rectangle to get 26 cm. In part (c), the pupils did not use the formula for the perimeter of an equilateral triangle properly. In part (d), the pupil was unable to apply the formula for finding the perimeter of a square. In part (e), the pupil failed to use the formula on the perimeter of a triangle to find the missing length of one side.

Despite the pupils' weak performance in this question, a total of 35,159 (2.3%) pupils attempted correctly all parts of this question. In part (a), they correctly sketched an equilateral triangle because they remembered to show the symbols which differentiate an equilateral triangle from other triangles. In part (b), the pupils were able to multiply the length of a rectangle by 2 to get 16 cm; multiply the width of a rectangle by 2 to get 10 cm; and added the results in steps one and two to get the perimeter of a rectangle equal to 26 cm. In part (c), they divided 57 by 3 to get the length of one side equal to 19 cm. In part (d), they multiplied 6 cm by 4 to get the perimeter of a square equals to 24 cm. In part (e), they subtracted a total of 12 cm and 15 cm from 45 cm to get the length of the remaining side equal to 18 cm. A sample of the pupils' correct answers is shown in Extract 4.2.

4. (a)	Draw an equilateral triangle.		
(b)	Find the perimeter of the following figure: 8 cm 5 cm 	 $P = L + W + L + W$ $P = 8 \text{ cm} + 5 \text{ cm} + 8 \text{ cm} + 5 \text{ cm}$ $P = 26 \text{ cm}$	26 cm
(c)	The perimeter of the triangle is 57 cm. If all sides are equal, find the length of one side.	$\begin{array}{r} 19 \\ 3 \overline{) 57} \\ \underline{57} \\ 0 \end{array}$ 19 cm	19 cm
(d)	Find the perimeter of the following square: 6 cm 	$P = L + L + L + L$ $P = 6 + 6 + 6 + 6$ $P = 24 \text{ cm}$	24 cm

(e)	The perimeter of a triangle is 45 cm. If one side is 12 cm long, second side 15 cm, find the length of the third side.	$\begin{array}{r} 12 \\ + 15 \\ \hline 27 \end{array}$ $\begin{array}{r} 45 \\ - 27 \\ \hline 18 \end{array}$	18cm
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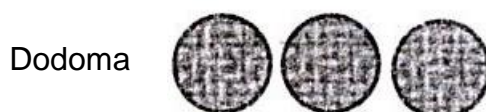
Extract 4.2: A sample answers from a pupil who responded correctly to all parts of question 4.

Extract 4.2 shows a sample response from a pupil who responded correctly to all parts of this question.

2.5 Question 5: Applying Statistical Skills to Present Different Information

This question had five parts that assessed the pupils' ability to apply statistical skills to present information. The question was as follows:

Study the following pictures which represent the number of pupils in three regions in 2015, then answer the questions that follow:



Key: Each complete symbol represents 50,000 pupils.

- What is the total number of pupils in all regions together?
- What is the total number of pupils in Iringa and Tanga regions?
- Which region has the least number of pupils.

- (d) Pupils in Tanga and Iringa represent what fraction of the total number of pupils.

Part (a) assessed the pupils' ability to find the total number of pupils in all regions. Part (b) assessed the pupils' ability to find the total number of pupils in Iringa and Tanga regions. Part (c) assessed the pupils' ability in identifying the region with the least number of pupils. Part (d) assessed the pupils' ability to write the fraction of Tanga region to the total number of pupils in all regions. Part (e) assessed the pupils' ability in finding the difference between the highest and the least number of pupils.

The analysis of the data shows that, a total of 1,128 (0.07%) pupils scored 10 marks, 13,595 (0.87%) pupils scored 8 marks, 38,898 (2.49%) pupils scored from 4 to 6 and 1,507,107 (96.56%) pupils scored from 0 to 2 marks. Thus, the pupils' performance was weak and the question was worst performed than all the questions in this assessment. The percentage of the pupils' performance is shown in Figure 6.

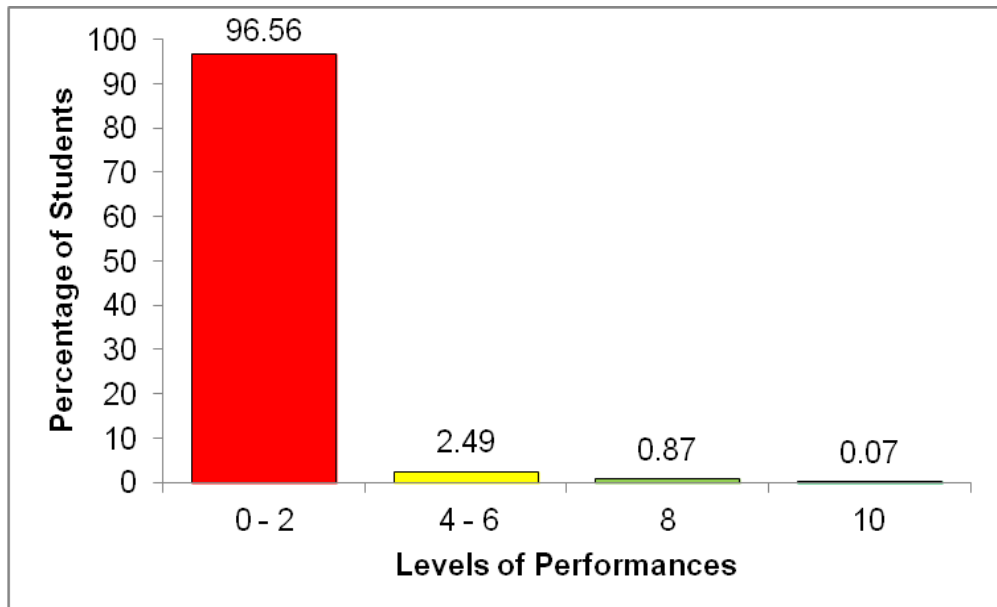





Figure 6: *Pupils' Performance in Question 5*

The analysis of the pupils' responses shows that, in part (a), pupils failed to interpret the given pictures in relation to the given key to get

the total number of pupils in three regions. For instance, several pupils supplied incorrect answers such as 150,000 instead of 325,000 pupils. In part (b), the pupils failed to use the given key to get the total number of pupils in Iringa and Tanga regions. For instance, one pupil wrote 100,000 pupils instead of 175,000. In part (c), the pupils were unable to identify that the region with the fewest number of pictures has the least number of pupils. Therefore, Tanga is the region with the lowest number of pupils. In part (d), the pupils failed to find the fraction of Tanga region to the total number of pupils in all regions. In part (e), most pupils listed the regions with the lowest number of pupils and the largest number of pupils as Dodoma and Tanga contrary to the requirements of the question that required them to find the difference between the region with the largest number of pupils and the least number of pupils. Sample responses from one of the pupils who produced incorrect answers are shown in Extract 5.1.

5.	<p>Study the following pictures which represent the number of pupils in three regions in 2015, then answer the questions that follow.</p> <p>Dodoma </p> <p>Tanga </p> <p>Iringa </p> <p>Key: Each complete symbol represents 50,000 pupils.</p> <p>(a) What is the total number of pupils in all regions together?</p>	<p>50,000 X 6 ----- 300,000</p>	<p>300,000</p>
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	(b) What is the total number of pupils in Iringa and Tanga regions?	$ \begin{array}{r} 50,000 \\ \times 2 \\ \hline 10,000 \end{array} $	<u>10,000</u>
	(c) Which region has the least number of pupils?	<u>Dodoma</u>	<u>Dodoma</u>
	(d) Pupils in Tanga Region represent what fraction of the total number of pupils?	<u>one and half</u>	<u>one and half</u>
	(e) What is the difference between the highest and the least number of pupils?	$ \begin{array}{r} 50,000 \\ - 49,994 \\ \hline 6 \end{array} $	<u>49994</u>

Extract 5.1: A sample of incorrect response to question 5.

Extract 5.1 shows the answer of a pupil who incorrectly interpreted the given picture and gave wrong responses to all parts of the question.

Despite the pupils' poor performance, very few pupils (0.07%) attempted all parts of this question correctly. In part (a), the pupils used the given pictures together with the information that one picture represents 50,000 pupils, and they got the total number of pupils in three regions equal to 325,000. In part (b), the pupils used the given pictures together with the information that one picture represents 50,000 pupils to get the total of pupils number in Iringa and Tanga regions equal to 175,000. In part (c), the pupils were able to identify Tanga as the region with the least number of pupils. In part (d), the

pupils wrote $\frac{75000}{325000}$ as the fraction representing pupils in Tanga region. In part (e), pupils subtracted the number of pupils in Tanga region from the number of pupils in Dodoma to get the difference between the highest and the least number of pupils equal to 75,000. A sample responses from one of the pupils who attempted the question correctly is shown in Extract 5.2.

<p>5.</p>	<p>Study the following pictures which represent the number of pupils in three regions in 2015, then answer the questions that follow.</p> <p>Dodoma </p> <p>Tanga </p> <p>Iringa </p> <p>Key: Each complete symbol represents 50,000 pupils.</p> <p>(a) What is the total number of pupils in all regions together?</p>	<p>Handwritten calculation:</p> $ \begin{array}{r} 50,000 \\ 50,000 \\ 50,000 \\ 50,000 \\ 50,000 \\ 50,000 \\ \hline 300,000 + 25,000 \\ \hline = 325,000 \end{array} $	<p>325000</p>
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	(b) What is the total number of pupils in Iringa and Tanga regions?	$\begin{array}{r} 50,000 + 50,000 \\ 25,000 = \underline{175,000} \text{ pupils} \end{array}$	175 000 pupils
	(c) Which region has the least number of pupils?	Tanga	Tanga
	(d) Pupils in Tanga Region represent what fraction of the total number of pupils?	$\frac{75,000}{325,000}$	$\frac{75,000}{325,000}$
	(e) What is the difference between the highest and the least number of pupils?	$\begin{array}{r} 150,000 \\ - 75,000 \\ \hline 75,000 \end{array}$	75 000 pupils

Extract 5.2: A sample answer from a pupil who managed to respond to question 5 correctly.

Extract 5.2 shows the responses from a pupil who responded correctly to all parts due to correct interpretations of the given word problems as well as adequate knowledge of the assessed competencies.

3.0 ANALYSIS OF PUPILS' PERFORMANCE IN EACH COMPETENCE

The Mathematics assessment paper had five (5) questions that required the pupils to mention different mathematical concepts or calculate and write answers in the spaces provided. The competencies that were assessed include; Applying the Concepts of Numbers to Communicate Ideas and Concepts in Different Contexts; Applying the Concepts of Patterns to Solve Real Life Problems;

Applying the Concepts of Shapes and Figures to Solve Different Problems; Applying Measurements in Different Life; and Applying Statistical Skills to Present Different Information.

The analysis of the pupils' performance in each competence of Mathematics subject shows that, there were no competences with good performance (See Appendix A and B). Further analysis shows that in the competences which were assessed in the SFNA 2021, the competence on the *Applying the Concepts of Patterns to Solve Real Life Problems* has increased by 4.48 percent in comparison to 2020 results where its performance dropped by 23.34 percent. On the other hand, the competence on the *Applying the Concepts of Numbers to Communicate Ideas and Concepts in Different Contexts* has decreased by 10.59 percent and the *competence on Applying Statistical Skills to Present Different Information* has decreased to a large extent by 48.47 percent.

4.0 CONCLUSION

The analysis of students' results in the assessed competencies revealed the absence of the competency with good performance. Further analysis shows that, the competence in applying the concepts of numbers to communicate ideas and concepts in different contexts (56.95%), applying the concepts of patterns to solve real life problems (48.84%) and applying the concepts of shapes and figures to solve different problems (43.74%) were performed averagely. However, the competencies in applying statistical skills to present different information (33.63%) and applying statistical skills to present different information (3.44%) were poorly performed.

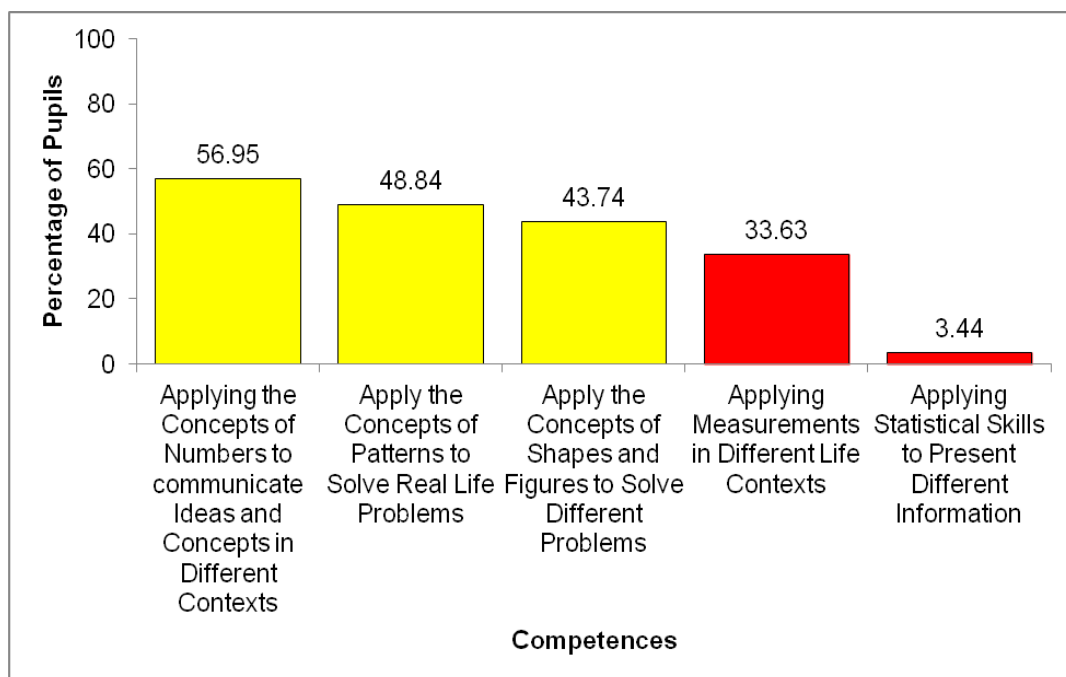
The pupils' weak performance was due to the following reasons: failure to identify the requirements of the questions, failure to perform mathematical operations on measurements of time as well as using incorrect formulae in answering questions on shapes and figures.

5.0 RECOMMENDATIONS

In order to facilitate the Standard Four Pupils to be competent in this subject, it is recommended that:

- (a) Teachers should provide many exercises to pupils on the competence of *Application of the Concept of Measurements in Different Contexts*. They should also make use of teaching aids such as clocks, digital watches that can be worn or hung on the wall so as to enhance the pupils' understanding on various concepts.
- (b) Teachers should put more emphasize on the relationship between pictures and number of items during the teaching of competence pertaining to Application of Statistical Skills to Present Different Information. For example, one picture of an egg represents 100 eggs.

Appendix A: SUMMARY OF PERFORMANCE IN EACH COMPETENCE IN SFNA 2021



Appendix B: COMPARISON OF PERFORMANCE IN EACH COMPETENCE IN SFNA 2020 AND SFNA 2021

