

**THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA**



**PUPILS' ITEM RESPONSE ANALYSIS REPORT  
FOR THE STANDARD FOUR NATIONAL  
ASSESSMENT (SFNA) 2019**

**04E MATHEMATICS**

**THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA**



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**04E MATHEMATICS**

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## FOREWORD

The Pupils' Item Response Analysis report for Standard Four National Assessment (SFNA) in 2019 has been prepared in order to give feedback to pupils, teachers, curriculum developers, policy makers and other education stakeholders on how pupils answered the assessment questions in Mathematics subject.

The analysis of the pupils' item responses shows that, some of the reasons that contributed to pupils' failure to answer the assessment questions correctly include; failure to identify the requirements of the question, making errors when performing mathematical operations, lack of arithmetic skills for writing and counting; and inadequate knowledge on solving word problems correctly.

The National Examinations Council of Tanzania believes that, this report will be helpful in improving pupils' competences in Reading, Writing and Counting skills from Standard One to higher classes. If these skills are well improved, they will build a strong base for competence in Mathematics subject.

Lastly, the National Examinations Council of Tanzania would like to thank all examination officers and other experts who participated in preparing this report.



Dr. Charles E. Msonde  
**EXECUTIVE SECRETARY**

## 1.0 INTRODUCTION

The National Assessment for Standard Four Pupils in Mathematics subject was held on 20<sup>th</sup> and 21<sup>st</sup> November 2019. A total of 1,786,729 pupils were registered, of which 1,664,210 pupils, equivalent to 93.14 percent sat for the assessment.

The analysis of data in Mathematics subject assessment results in 2019 shows that, 1,231,640 pupils, equivalent to 74.02 percent, passed. In 2018, a total of 1,300,957 pupils, equivalent to 95.5 percent, were assessed and out of those 1,077,095 pupils, equivalent to 82.80 percent passed. These results show that, the performance in 2019 has decreased by 8.78 percent as compared to the performance in 2018.

The mathematics assessment paper consisted of five (5) questions. Each question had five parts, that is; (a), (b), (c), (d) and (e) where 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 assessment paper.

The pupils' responses in each question were analysed in order to identify the reasons that made the pupils pass or fail. The samples of extracts from some of the pupils were provided in order to illustrate the actual performance of pupils in the assessment in specific questions.

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

## **2.0 THE ANALYSIS OF THE PUPILS' RESPONSES IN EACH QUESTION**

### **2.1 Criteria for Analysis**

The analysis of the pupils' responses has been done in each item based on the number and percentage of the pupils' performance as follows:

- (a) Those who failed to answer correctly any item or answered correctly one item, (0 to 2 marks).
- (b) Those who answered correctly two or three items, (4 to 6 marks).
- (c) Those who answered correctly four items, (8 marks).
- (d) Those who answered correctly all the five items, (10 marks).

In this report four types of colours have been used in the analysis charts in order to show the pupils' performance in each question. These colours are green, light green, yellow and red for very good, good, average and weak performance respectively.

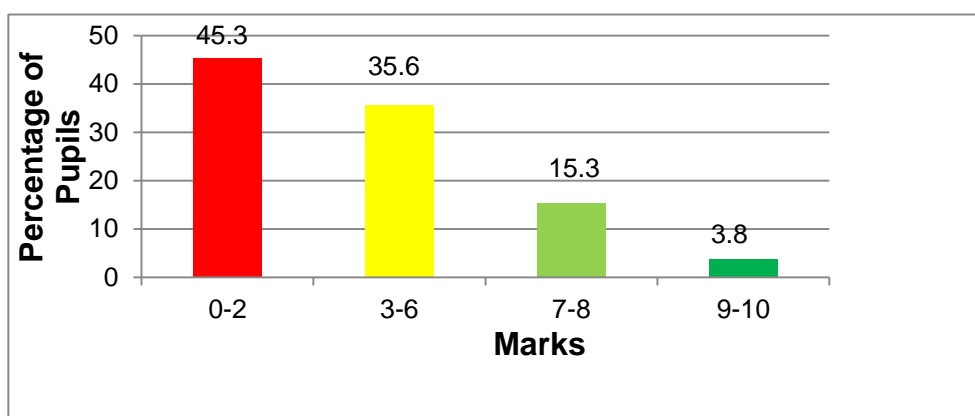
### **2.2 Question 1:**

- (a) Write the digit for thousands, hundreds, tens and ones of the number 10,529 in words.
- (b) Write 49 in Roman numbers.
- (c) Which digit of the number 78,421 has the place value of ten thousands?
- (d) Write the following number in short form:  
 $8000 + 400 + 60 + 3$ .
- (e) A book has three hundred and eight pages. Write the number of pages of this book in numerals.

This question had five parts which assessed skills on the competence in applying the concepts of numbers to communicate in different context. Part (a) assessed the pupils' knowledge on place value of numbers and how to write them in words, part (b) assessed the pupils' ability to read and write Arabic numbers into Roman numbers, part (c) assessed the pupils' knowledge on identifying the place value of a particular digit from the given whole number, part (d) assessed the

pupils' ability to write the number in short form and part (e) assessed the pupils' ability to relate the concept of numbers with the real life context.

The analysis of data shows that, the performance in this question was an average because a total of 909,824 pupils, equivalent to 54.7 percent scored from 4 to 10 marks. Among these pupils, 317,312, equivalent to 19.1 percent scored more than 6 marks and 592,512 pupils, equivalent to 35.6 percent scored 3 to 6 marks. However, 754,361 pupils, equivalent to 45.3 percent had weak performance because they scored 0 to 2 marks. Figure 1 shows the summary of performance in this question.



**Figure 1:** *The percentage of pupils and scores in question 1.*

Further analysis of data shows that, out of 754,361 pupils who performed poorly in this question, 450,679 equivalent to 27.1 percent scored 0 mark. These pupils failed to answer the question correctly due to different reasons including; failure to write the required numbers in words in part (a). For example, some of the pupils wrote the given number in groups of two digits instead of writing; thousands 0, hundreds 5, tens 2 and ones 9. Moreover, in part (b) the pupils failed to write 49 into Roman numbers. These pupils did not remember the rule that when I is behind X, that is IX, it means  $10-1=9$ . Therefore, the wrote 49 as XXXXVIII, which is incorrect answer. Those pupils did not recognise that 49 is written by using L which is 50, X which is 10 and I which is 1 by writing XLIX.



Moreover, some of the pupils failed to identify and write the number in the place of ten thousands from the number 78,421 which could be 7 in part (c). In part (d), they were unable to write  $8000 + 400 + 60 + 3$  in short form, that is 8463, due to lack of knowledge on addition of whole numbers. In part (e), they failed to write by numerals the given number which is three hundred and eight due to failure to understand that number zero should be written in the tenth place, that is 308. Extract Na. 1.1 shows an example of incorrect response from one of the pupils who responded incorrectly.

No	Question	Working Space	Answer
1.(a)	Write the digit for thousands, hundreds, tens and ones of the number 10,529 in words.	$\begin{array}{r} 10 \\ 10,529 \end{array}$	<u>18749</u>
(b)	Write 49 in Roman numbers.	XLIX	ANSWER=XLXI
(c)	Which digit of the number 78421 has the place value of ten thousands?	<u>Seven Eight and four</u> <u>tenone</u>	<u>Seven eight and</u> <u>four tenone</u>
(d)	Write the following number in short form: $8000 + 400 + 60 + 3$	$\begin{array}{r} 8000 \\ +400 \\ 60 \\ 3 \\ \hline 8000 \end{array}$	<u>ANSWER=2000</u>
(e)	A book has three hundred and eight pages. Write the number of pages of this book in numerals.	$\begin{array}{r} 80 \\ 30 \\ \hline 50 \end{array}$	<u>ANSWER=50</u>

Extract 1.1: A sample of incorrect answers from one of the pupils.

In extract 1.1 part (a); The pupil failed to abide to the requirement of the question. Instead of writing the digits in words, the pupil re-wrote

the given number, in part (b) the pupil could not realize whether number I comes before X or after X to represent number 9, in part (c) the pupil wrongly wrote the given number in words instead of writing the number whose place value is ten thousands. In part (d) pupil added the given numerals of the number instead of writing it in short form. In addition, in part (e) the pupil lacked knowledge of application of multiplication operation as the pupil just subtracted 3 from 8 to get 5 and conclude by writing 50.

Despite the average performance in this question, a total of 45,648 pupils, equivalent to 2.7 percent managed to answer all the items correctly. These pupils were able to write; the numbers in words, the Arabic numbers into Roman numbers, the place value of a digit in the given whole number and a whole number given in long form into short form. Extract 1.2 shows the sample of the correct answer from one of the pupils who responded correctly.

No	Question	Working Space	Answer
1.(a)	Write the digit for thousands, hundreds, tens and ones of the number 10,529 in words.	$\begin{array}{r} 10529 \\ \text{Thousands} \\ \text{Hundreds} \\ \text{Tens} \\ \text{Ones} \end{array}$	Ones = Nine Tens = two Hundreds = five Thousands = zero.
(b)	Write 49 in Roman numbers.	$49 = XLIX$	$= XLIX$
(c)	Which digit of the number 78421 has the place value of ten thousands?	$\begin{array}{r} 78421 \\ \text{Ten thousands} \\ \text{Thousands} \\ \text{Hundreds} \\ \text{Tens} \\ \text{Ones} \end{array}$	$= 7$ is in ten thousands.
(d)	Write the following number in short form: $8000 + 400 + 60 + 3$	$8000 + 400 + 60 + 3 = 8463$	$= 8463$
(e)	A book has three hundred and eight pages. Write the number of pages of this book in numerals.	three hundred and eight = 308	$= 308$

Extract 1.2: A sample of correct answers given by a pupil.

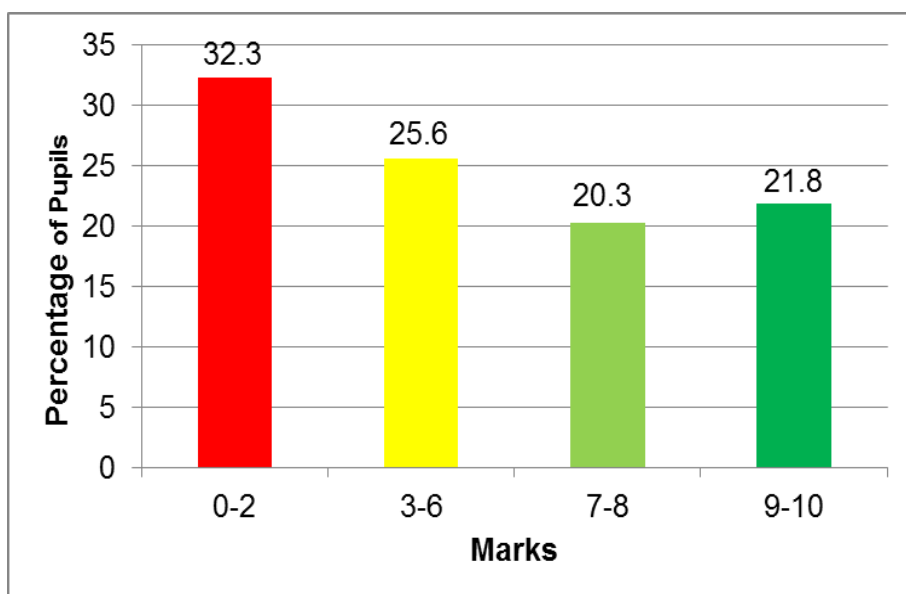
In extract 1.2 the pupil managed to write correctly the digits for thousands, hundreds, tens and ones of the given number. Likewise, this pupil managed to write Roman numbers and the given number in short form correctly. The pupil was also able to use multiplication operation correctly to attain the correct answer in part (e).

### **2.3 Question 2:**

- (a) Write the next number in the following sequence: 4, 6, 8, 10, \_\_\_\_.
- (b) Arrange the following numbers starting from the smallest to the largest: 9, 3, 11, 5, 7, 1, 13.
- (c) Write the missing numbers in the following sequence of Roman numbers: X, XV, XX, \_\_\_\_, XXX, \_\_\_\_.
- (d) Fill in the missing number in the following sequence: 461, 361, 261, \_\_\_\_, 61.
- (e) A businessman bought 64 oranges, 42 pawpaws, 100 mangoes and 98 bananas. Re-arrange the names of the fruits according to the quantity from the largest to the smallest quantity.

This question assessed different skills in each part as follows; in part (a), (c) and (d), it assessed the pupils' ability to identify and write the missing numbers in the given sequences. Part (b) assessed the pupils' skills on how to arrange the given numbers starting from the smallest to the largest and part (e) assessed the pupils ability to solve the given word problem by identifying and writing the names of the fruits starting with the largest to the smallest quantity.

The analysis of data shows that, the performance in this question was good since 1,126,388 pupils, equivalent to 67.7 percent scored more than 2 marks. The rest of the pupils, i.e.; 537,797 equivalent to 32.3 percent had weak performance as they scored from 0 to 2 marks. The percentage and scores of pupils in this question are presented in Figure 2.



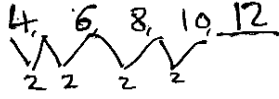
**Figure 2:** *The percentage of pupils and their scores in question 2.*

The analysis of data shows that, in part (a), pupils managed to realise that in the sequence of numbers 4,6,8,10, \_\_\_\_\_, the consecutive numbers, that is; 4 and 6, 6 and 8 or 8 and 10 differ by 2. Every number is obtained by adding 2 to the previous number. Therefore, they managed to find the next number which was 12. In part (c), the pupils realised that the sequence of numbers; X, XV, XX, \_\_\_\_\_, XXX, \_\_\_\_\_ is the consecutive numbers which differ by V. These numbers are obtained by adding V to the previous number. This shows that the pupils had knowledge to find the missing numbers from the sequence of Roman numbers.

Moreover, in answering part (d) they realised that in the sequence of numbers 461, 361, 261, \_\_\_\_\_ 61, the consecutive numbers 461 and 361 or 361 and 261 differ by 100. Thus, every number is obtained by subtracting 100 from the previous number. For example;  $461 - 100 = 361$  and  $361 - 100 = 261$ . Therefore they managed to find correctly the missing number which is 161.

The analysis shows that, out of 1,126,388 (67.7%) pupils who scored more than 2 marks in this question, 310,866 pupils, equivalent to 18.7 percent answered it correctly by scoring 10 marks. Those pupils were able to identify the missing numbers in the given sequences, arrange the given numbers from the smallest to the largest, and arrange the

names of the fruits according to their quantities from the largest and the smallest amount of fruits. Extract 2.1 shows a sample of the correct answers.

No	Question	Working Space	Answer
2. (a)	Write the next number in the following sequence: 4, 6, 8, 10, ____.		4, 6, 8, 10, <u>12</u>
(b)	Arrange the following numbers starting from the smallest to the largest: 9, 3, 11, 5, 7, 1, 13.	9, 3 11, 5, 7, 1, 13 1, 3, 5, 7, 9, 11, 13	1, 3, 5, 7, 9, 11, 13,
(c)	Write the missing numbers in the following sequence of roman numbers. X, XV, XX, ____, XXX, ____.	X, X V, XX, <del>XXV</del> xxx, <del>xxxv</del> .	X, x V, XX, <del>XXV</del> xxx, <del>xxxv</del> .
(d)	Fill in the missing number in the following sequence: 461, 361, 261, ____, 61.	46, 361, 261 <u>161</u> 61	46, 361, 261 <u>161</u> , 61
(e)	A businessman bought 64 oranges, 42 pawpaws, 100 mangoes and 98 bananas. Re-arrange the names of the fruits according to the quantity from the largest to the smallest quantity.	100 mangos 98 bananas 64 oranges 42 pawpaws	100 mangos 98 bananas 64 oranges 42 paw paws

Extract 2.1: A sample of correct answers from one of the pupils.

In extract 2.1; the pupil managed to identify and write correctly the missing numbers in part (a), (c) and (d), similarly, that pupil was able to arrange correctly the given numbers from the smallest to the largest in part (b) and largest to smallest quantity of fruits in part (e).

On the other hand, the analysis of data shows that, out of 537,797 pupils who had weak performance, 345,461 equivalent to 20.8 percent

scored 0 mark. These pupils failed to identify the missing numbers in the sequence that was provided in parts (a), (c) and (d). In addition, in part (a), pupils failed to realize that in the sequence; 4, 6, 8, 10, \_\_\_\_, the number were increasing by 2. The next number was obtained by adding 2 to the previous number. According to this challenge, there were some pupils who wrote the missing number as 11 without considering the difference between the consecutive numbers in the given sequence.

Furthermore, in part (b), these pupils failed to realize that they were required to arrange the given numbers 9, 3, 11, 5, 7, 1 and 13 starting from the smallest to the largest number. Thus, there were some pupils who selected a few numbers and arranged them. For instance, one pupil wrote, 1, 3, 9, 11. Another wrote 1591113 and another one wrote 13, 1, 7, 5, 11, 3, 9. Some of the pupil arranged the numbers starting from the largest to the smallest that is 13, 11, 9, 7, 5, 3, 1. Also, there were pupils who failed to write properly the numbers such as leaving a space between the numbers or using a comma sign in order to separate the numbers. This indicates that they had insufficient knowledge on arranging numbers. Likewise, one of the pupils wrote 111133579. In part (c), the pupils did not know that, in the given sequence; X, XV, XX, \_\_\_\_, XXX the numbers differed by V. The next number was obtained by adding V to the previous number. This shows that some of the pupils lacked knowledge about sequence of Roman numbers.

Moreover, the pupils who failed to answer part (d) correctly could not realize that the sequence; 461, 361, 261, \_\_\_\_, 61 was made of consecutive numbers which differ by 100. Therefore they gave different incorrect answers. The examples of incorrect answers from the pupils are 41, 51, 262, 471, 451, 561, and 571. The next number could be obtained by subtracting 100 from the previous number, that is  $261 - 100 = 161$ . In part (e), the pupils failed to identify and write the name fruits from large quantity to the smaller quantity as was required. In this part the pupils added the figures while others copied the lists

from the question. For instance one pupil wrote

	6	4	4	2	
+	1	0	0	9	8
	1	6	5	4	0

Another pupil arranged from smallest number to the largest one, that is; pawpaw 42, oranges 62, bananas 98 and mangoes 100 indicating failure to understand the task of the question. Extract 2.2 illustrates a sample of incorrect answer provided by one of the pupils.

No	Question	Working Space	Answer
2. (a)	Write the next number in the following sequence: 4, 6, 8, 10, ____.	Write the next number in the following sequence 4, 6, 8, 10, —	= 1
(b)	Arrange the following numbers starting from the smallest to the largest: 9, 3, 11, 5, 7, 1, 13.	Arrange the following number starting from the smallest to the largest 9, 3, 11, 5, 7, 1, 13	= 13, 11, 9, 5, 7, 5.
(c)	Write the missing numbers in the following sequence of roman numbers. X, XV, XX, <u>X</u> , XXX, <del>XXXX</del> X	Write X, XV, XX, — XXX —	X. XXXX X
(d)	Fill in the missing number in the following sequence: 461, 361, 261, _____, 61.		= 100.
(e)	A businessman bought 64 oranges, 42 pawpaws, 100 mangoes and 98 bananas. Re-arrange the names of the fruits according to the quantity from the largest to the smallest quantity.	$  \begin{array}{r}  100 \\  98 \\  + 64 \\  \hline  42 \\  \hline  305  \end{array}  $	= 305

Extract 2.2: A sample of incorrect answers provided by one of the pupils.

Extract 2.2 shows that, the pupil was not aware of the requirement of the question because; in part (a) the pupil wrote the next number in the sequence as equal to 1, in part (b) the pupil arranged the number

from the largest to the smallest instead of doing the reverse. Likewise, the same misconception was done leading to incorrect answers in part (c) and (d). In addition, in part (e) the pupil wrote the total quantity of the given fruits instead of arranging them as the question required.

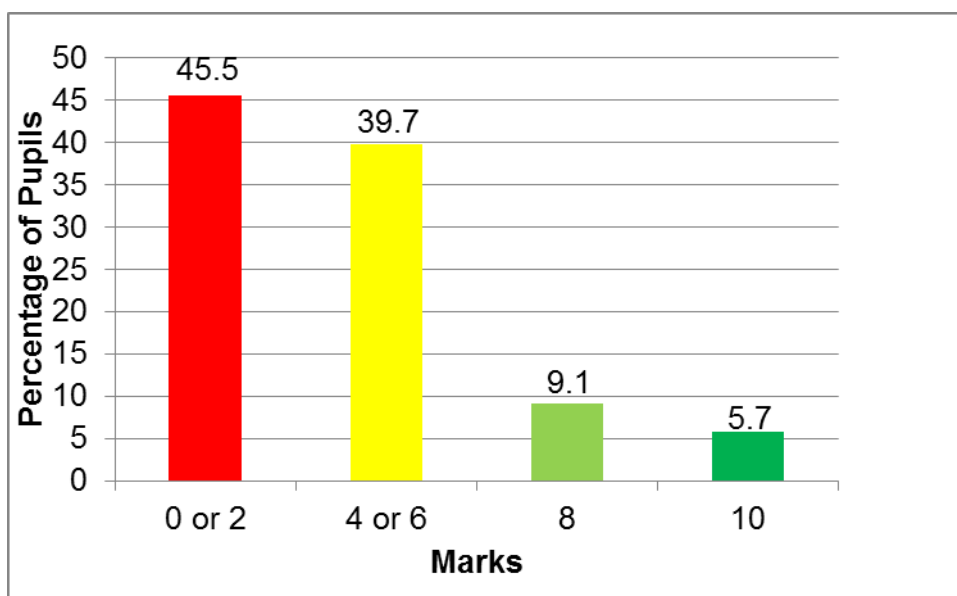
## 2.4 Question 3:

- (a) Add;  $1,564 + 315 =$
- (b) Divide;  $15 \overline{)900}$
- (c) The book has 91 pages. If each page has 13 pictures, find the total number of pictures in that book.
- (d) Multiply;  $72 \times 58 =$
- (e) The number of zebras in the National Parks in Tanzania was 3,211. If 195 Zebras increased the next year, find the total number of zebras in the National Park.

This question had five parts from the competence of application of mathematical operations in solving problems. The question assessed different skills in each part whereby part (a) assessed the pupil's ability to add whole numbers with different amount of digits, part (b) assessed the pupils' ability to perform division of whole numbers in which the divisor has two digits and the dividend has three digits. Part (c) and (d) assessed the pupils' ability to perform multiplication on whole numbers involving two digits from the given word problem. Part (e) assessed the pupils' ability to apply the skills of addition on whole numbers from the given word problem.

The performance in this question was an average because 907,553 pupils, equivalent to 54.5 percent scored 4 to 10 marks. There were 756,632 pupils equivalent to 45.5 percent who had weak performance since their scores were either 0 or 2 marks. Figure 3 shows the percentage of pupils and scores for each category of performance.





**Figure 3:** *The percentage of pupils and their scores in question 3.*

Further analysis of data in this question shows that, 457,894 pupils, equivalent to 27.5 percent got 0 mark. These pupils failed to answer the question correctly due to different reasons as follows; in part (a), there were pupils who failed to get the correct answer due to insufficient knowledge and skills on how to add numbers involving different number of digits. In this case, the pupils failed to arrange the digits in groups of ones, tens, hundreds and thousands before adding. For instance, some of the pupils wrote;

$$\begin{array}{r}
 1 \ 5 \ 6 \ 4 \\
 + \ 3 \ 1 \ 5 \\
 \hline
 4 \ 7 \ 1 \ 4
 \end{array}$$

instead of writing;

$$\begin{array}{r}
 1 \ 5 \ 6 \ 4 \\
 + \quad 3 \ 1 \ 5 \\
 \hline
 1 \ 8 \ 7 \ 9
 \end{array}$$

In part (b), some of the pupils failed to divide 900 by 15 to get the correct answer because they lacked knowledge and skills on how to

divide whole numbers in which the divisor has two digits and the dividend has three digits using long division method. For instance, some of them added instead of dividing as they wrote;

$$\begin{array}{r} 9 \ 0 \ 0 \\ \div \quad 1 \ 5 \\ \hline 9 \ 1 \ 5 \end{array}$$

They were required to perform division as follows:

$$\begin{array}{r} 60 \\ 15 \overline{) 900} \\ \underline{90} \phantom{0} \\ -0 \phantom{0} \\ \underline{-0} \end{array}$$

In parts (c) and (d), the pupils failed to multiply whole numbers because they lacked skills on multiplication of whole numbers. So they failed to multiply 91 by 13 as well as 78 and 52 hence ended with incorrect answers. Moreover, in part (c) some of the pupils arranged 91 and 273 wrongly during adding, hence got incorrect answer. Instead of writing

$\begin{array}{r} 9 \ 1 \\ \times \ 1 \ 3 \\ \hline 9 \ 1 \phantom{0} \\ 2 \ 7 \ 3 \\ \hline 1 \ 1 \ 8 \ 3 \end{array}$	some of them wrote;	$\begin{array}{r} 9 \ 1 \\ \times \ 1 \ 3 \\ \hline 9 \ 1 \phantom{0} \\ 2 \ 7 \ 3 \\ \hline 3 \ 6 \ 4 \end{array}$
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In part (e), these pupils failed to get the correct answer because of lack of skills to add whole numbers with four and three digits from the given word problem. Some of the pupils could not realize the requirements of the question because, they subtracted the numbers instead of adding. For instance, one of the pupils wrote;

$$\begin{array}{r}
 3 \ 2 \ 1 \ 1 \\
 + \ 1 \ 9 \ 5 \\
 \hline
 5 \ 1 \ 6 \ 1
 \end{array}
 \quad \text{and some wrote} \quad
 \begin{array}{r}
 3 \ 2 \ 1 \ 1 \\
 - \quad 1 \ 9 \ 5 \\
 \hline
 3 \ 1 \ 8 \ 4
 \end{array}$$

the correct answer because they did not arrange properly the number in the step of addition. Extract 3.1 shows the responses of one of the pupils who were not able to answer the question correctly.

No	Question	Working Space	Answer
3. (a)	Add; $1,564 + 315 =$	$  \begin{array}{r}  1,564 \\  + \ 315 \\  \hline  18879  \end{array}  $	$=18879$
(b)	Divide; $15 \overline{)900}$	$  \begin{array}{r}  15 \\  \hline  15 \overline{)900} \\  \underline{900} \\  000  \end{array}  $	$=15$
(c)	The book has 91 pages. If each page has 13 pictures, find the total number of pictures in that book?	$  \begin{array}{r}  91 \\  \times 13 \\  \hline  91 \\  + 63 \\  \hline  74  \end{array}  $	$=74$
(d)	Multiply; $72 \times 58 =$	$  \begin{array}{r}  72 \\  \times 58 \\  \hline  678  \end{array}  $	$678$
(e)	The number of Zebras in one of the Tanzanian National Parks was 3211. If 195 Zebra increased the next year, find the total number of Zebras in that National Park.	$  \begin{array}{r}  3 \ 2 \ 1 \ 1 \\  + \ 1 \ 9 \ 5 \\  \hline  5 \ 1 \ 6 \ 1  \end{array}  $	ANSWER=5161

Extract 3.1: A sample of incorrect answers form one of the pupils.

In extract 3.1; the pupil made mistake as follows; in part (a) the pupil failed to add correctly by writing the digit 8 at thousands place value. In part (b) the pupil performed wrongly the division operation and wrote the divisor as the quotient above the dividend, in part (c) and (d) the pupil failed to multiply the given numbers as a result the answers

were wrong. Similarly, in part (e), the pupil was unable to arrange properly the numbers before adding and therefore ended with an incorrect answer.

On the other hand, out of 907,553 pupils who answered correctly this question, 95,114 pupils, equivalent to 5.7 percent scored all 10 marks. These pupils had adequate knowledge and skills to; add whole numbers with different number of digits, perform division of whole numbers in which the divisor has two digits and the dividend has three digits and multiply whole numbers involving two digits as well as applying techniques of addition to whole numbers involving four digits from the given word problem correctly as shown in Extract 3.2.

No	Question	Working Space	Answer
3. (a)	Add; $1,564 + 315 =$	$\begin{array}{r} 1,564 \\ + 315 \\ \hline 1,879 \end{array}$	$= 1,879$
(b)	Divide; $15 \overline{)900}$	$\begin{array}{r} 60 \\ 15 \overline{)900} \\ \underline{90} \phantom{0} \\ 0 \phantom{0} \end{array}$	60
(c)	The book has 91 pages. If each page has 13 pictures, find the total number of pictures in that book?	$\begin{array}{r} 91 \\ \times 13 \\ \hline 273 \\ 91 \phantom{0} \\ \hline 1183 \end{array}$	$= 1183$
(d)	Multiply; $72 \times 58 =$	$\begin{array}{r} 72 \\ \times 58 \\ \hline 576 \\ 360 \phantom{0} \\ \hline 4176 \end{array}$	$= 4,176$
(e)	The number of Zebras in one of the Tanzanian National Parks was 3211. If 195 Zebra increased the next year, find the total number of Zebras in that National Park.	$\begin{array}{r} 3211 \\ + 195 \\ \hline 3,406 \end{array}$	$= 3,406$

Extract 3.2: A sample of correct answers provided by one of the pupils.

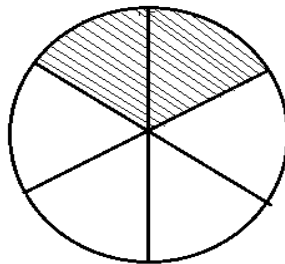
Extract 3.2 shows that, the pupil managed to add, divide and multiply correctly in all parts of this question. This indicates that the pupil had adequate knowledge and skills about mathematical operations.

## 2.5 Question 4:

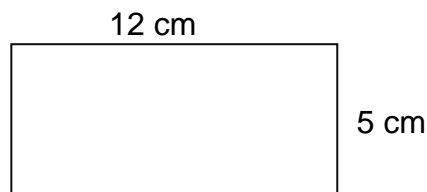
- (a) Write the name of the following line:



- (b) Which fraction in the following figure is shaded?



- (c) Find the perimeter of the following figure:

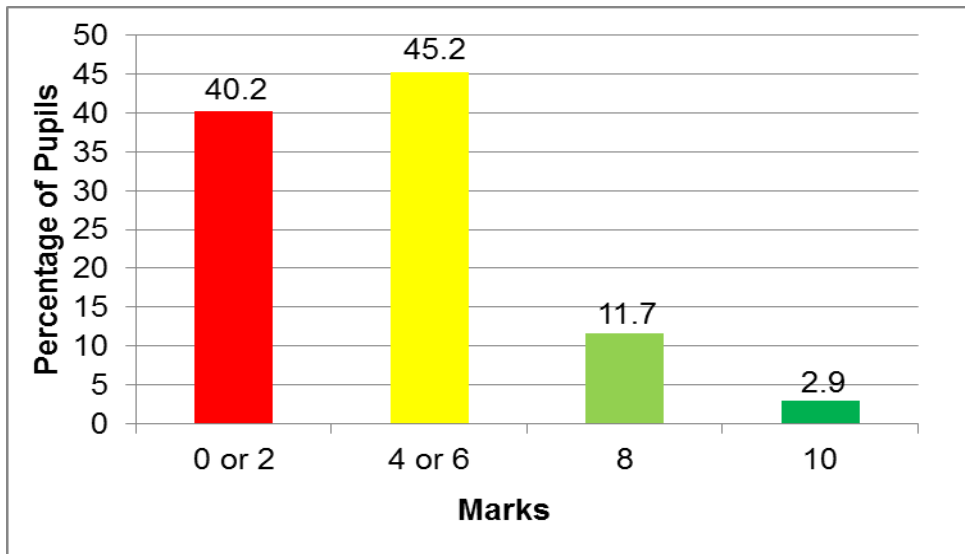


- (d) Jamila's garden has the shape of triangle. The first side has the length of 10 m, the second 25 m and the third side 18 m. Find the perimeter of the garden.
- (e) The perimeter of the rectangle is 42 cm. If its length is 12 cm, find the width of the rectangle.

This question had five parts set from the competence of applying the concepts of shapes and figures to solve different problems whereby part (a) assessed the pupils' ability to identify the name of the given figure, part (b) assessed the pupils' ability to identify and write the fraction of the shaded part of the given figure. Part (c) assessed the pupils' knowledge in finding the perimeter of a rectangle whose lengths of sides were given. Part (d) assessed the pupils' knowledge to find the perimeter of the triangle while part (e) assessed the pupils'

ability to find the width of the rectangle whose perimeter and one of its sides were given.


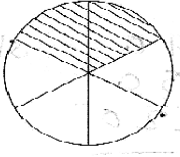

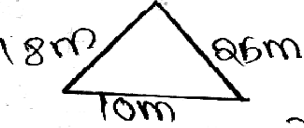
Generally the performance in this question was an average because 995,558 pupils, equivalent to 59.8 percent scored from 4 to 10 marks. However, 668,627 pupils, equivalent to 40.2 percent had weak performance since they scored 0 or 2 marks. Figure 4 shows the distribution of pupils and their corresponding scores in this question percentagewise.



**Figure 4:** The percentage of pupils and their scores in question 4.

Further analysis shows that, out of 995,558 pupils who had good performance in this question, 47,079 pupils, equivalent to 2.8 percent scored all the 10 marks. These pupils were able to; (a) identify the points on the line and write the correct name of the line. Also, in part (b) they able to write the fraction of the shaded part correctly in the circle as 2 out of 6, that is  $\frac{2}{6}$ . In part (c) they were able to find the perimeter of the rectangle by using the correct formula, Perimeter = 2(Length+Width) or Perimeter=2(12+5)=34 cm. In part (d) they were able to remember and use the formula for finding the perimeter of the triangle which is defined as Perimeter = Sum of the lengths of all three sides so that;

Perimeter =  $(10\text{m} + 25\text{m} + 18\text{m}) = 53\text{m}$ . Furthermore, in part (e) they were able to find the width of the rectangle by using correct formula which is  $\text{Perimeter} = 2(\text{length} + \text{width})$ . Thus,  $42 = 2(12 + \text{width})$ . Hence,  $\text{width} = 21 - 12 = 9\text{ cm}$ . Extract 4.1 shows a sample answer of a pupil who answered this question correctly.

No	Question	Working Space	Answer
4.(a)	Write the name of the following line: 	$PQ = \text{is a line segment}$	$PQ \text{ is a line segment}$
(b)	Which fraction in the following figure is shaded? 	$\frac{2}{6}$	$\frac{2}{6}$
(c)	Find the perimeter of the following figure: 	$P = 2L + 2W$ $L = 12\text{ cm}$ $W = 5\text{ cm}$ $(12\text{ cm} \times 2) + (5\text{ cm} \times 2)$ $\begin{array}{r} 24 \\ + 10 \\ \hline 34\text{ cm} \end{array}$	$P = 34\text{ cm}$
(d)	Jamila's garden has the shape of a triangle. The first side has the length of 10 m, the second 25 m and the third side 18 m. Find the perimeter of the garden.	 $P = (25\text{ m} + 18\text{ m} + 10\text{ m})$ $= 53\text{ m}$	$53\text{ m}$
(e)	The perimeter of the rectangle is 42 cm. If its length is 12 cm, find the width of the rectangle.	$P = 42\text{ cm}$ $- 12\text{ cm}$ $P = 2(L + W)$ $42 - (12 + 12) = 21$	$\text{width} = 9\text{ cm}$

Extract 4.1: A sample of a correct answer given by a pupil.

In extract 4.1; the pupil was able to identify and name the given line in part (a), recognise the fraction shaded in part (b), find the perimeter of the rectangle in part (c), find the perimeter of the triangle in part (d) and find the width of the triangle in part (e). This shows that the pupil had enough knowledge and skills on figures and shapes.


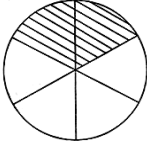
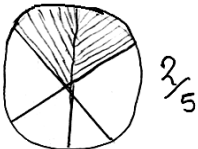
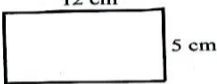
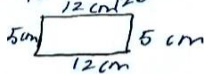
Despite the average performance in this question, the analysis of data shows that, out of 668,627 pupils, equivalent to 40.2 percent who scored 0 or 2 marks, 269,437 pupils, equivalent to 16.2 percent scored 0 mark and 397,997 pupils, equivalent to 23.9 percent scored 2 marks. The pupils who failed to answer this question correctly lacked skills in different concepts that were tested as follows; in part (a), the pupils failed to identify the relationship between points and the given figure so they mentioned incorrect names. For instance, some pupils mentioned the line as P, while others named it as Q. Furthermore others wrote the names of the line as arrow, line to show dates, line, rectangle, square or continuous line.

In part (b), the pupils failed to count properly the fractions that were divided from the given circle, as the result some of them wrote the fraction as  $\frac{2}{5}$  instead of  $\frac{2}{6}$ . Also, they were unable to differentiate between the denominator and numerator. Therefore, they incorrectly wrote  $\frac{6}{2}$  instead of  $\frac{2}{6}$  where the shaded part is the numerator. Some pupils wrote whole numbers such as 3, 6 and 9 instead of fraction.

In part (c), they lacked knowledge about the formula required for finding the perimeter of the given rectangle. Some of them added the two widths to get 10 cm and multiplied by the length to get  $10\text{ cm} \times 12\text{ cm} = 120\text{ cm}$ . Some pupils added the two sides,  $\text{Perimeter} = 5\text{ cm} + 12\text{ cm} = 17\text{ cm}$ , while others multiplied the two sides,  $\text{Perimeter} = 5\text{ cm} \times 12\text{ cm} = 60\text{ cm}$ . In part (d), the pupil could not realize the relationship between the perimeter of a triangle and its sides. For instance, one pupil wrote  $\text{Perimeter} = 25\text{ cm} + 18\text{ cm} = 43\text{ cm}$  and another one wrote  $\text{Perimeter} = 25\text{ cm} + 10\text{ cm} = 35\text{ cm}$ . In part (e), the pupils could not realize how to find the width of the rectangle where the perimeter and



the length were given. Some of the pupils added the numbers in the question regardless what the number represent. For instance, one of the pupils wrote,  $\text{Width} = 42 \text{ cm} + 12 \text{ cm} = 54 \text{ cm}$ . Another pupil wrote  $\text{Width} = (42 \text{ cm} + 12 \text{ cm}) \times 2 = 108 \text{ cm}$ . Some of the pupil wrongly multiplied the perimeter and the length hoping to get the width of the rectangle as seen in Extract 4.2.

4.(a)	Write the name of the following line: 	line sgement	line sgement
(b)	Which fraction in the following figure is shaded? 	 $\frac{2}{5}$	$\frac{2}{5}$
(c)	Find the perimeter of the following figure: 	$\begin{array}{r} 12 \text{ cm} \\ + 12 \text{ cm} \\ \hline 24 \\ + 5 \\ \hline 29 \\ + 5 \\ \hline 34 \end{array}$ 	120
(d)	Jamila's garden has the shape of a triangle. The first side has the length of 10 m, the second 25 m and the third side 18 m. Find the perimeter of the garden.	$\begin{array}{r} 25 \text{ m} \\ + 18 \text{ m} \\ \hline 43 \end{array}$	26 m
(e)	The perimeter of the rectangle is 42 cm. If its length is 12 cm, find the width of the rectangle.	$\begin{array}{r} 42 \text{ cm} \\ \times 12 \text{ cm} \\ \hline 504 \end{array}$	44 cm

Extract 4.2: A sample of incorrect answers provided by one of the pupils.

In extract 4.2; the pupil could not realize the name of the given figure in part (a), the pupil also presented a wrong fraction of the shaded

part of the circle in part (b) and did an incorrect calculation of the perimeter in part (c). Moreover, the pupil failed to perform the procedures that could be a guide to the correct answer of perimeter and width in parts (d) and (e) respectively.

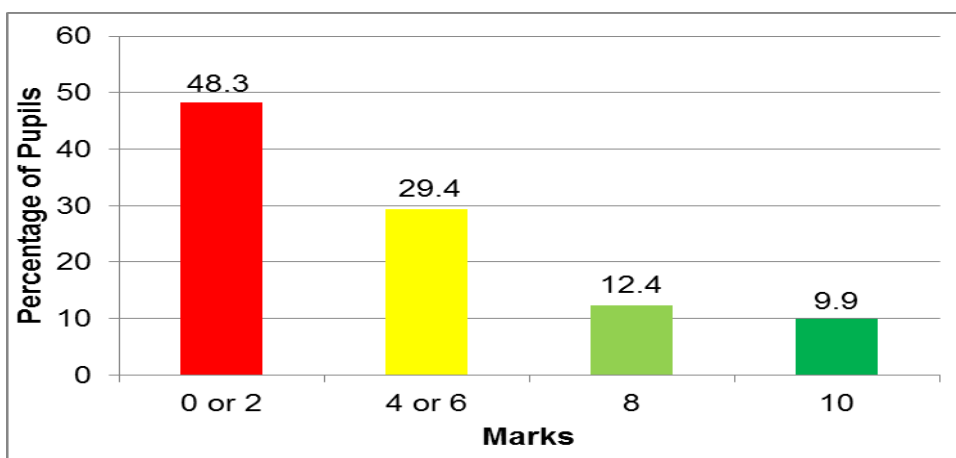
## 2.6 Question 5:

- (a) Add; shs. 2,570 + shs. 1,650=
- (b) Subtract; shs. 2,780 - shs. 1,890=
- (c) Multiply  

$$\begin{array}{r} \text{shs. } 2 \ 0 \ 0 \\ \times \quad 2 \ 5 \\ \hline \end{array}$$
- (d) Kalunde gave his grandmother fifteen thousand shillings. Sara also gave her five thousand shillings. How much money did the grandmother receive all together?
- (e) One table is sold at shs. 7,000. How much money will 5 tables be sold?

This question had five parts which were about the application of mathematical operations on money. The question assessed different skills in each part where; part (a) assessed the pupils' ability to perform addition of numbers about money, part (b) assessed the pupil's ability to perform subtraction of numbers about money and part (c) assessed the pupils' ability to perform multiplication of numbers about money. Part (d) assessed the pupils' ability to use addition operation to solve the given word problem involving money and part (e) assessed the pupils' ability to use multiplication operation to solve the given word problem about money.

The analysis of data shows that, the performance of pupils in this question was average since 859,861 pupils, equivalent to 51.7 percent scored from 4 to 10 marks. However, 804,324 pupils, equivalent to 48.3 percent had weak performance since they scored 0 or 2 marks. The performance of pupils in this question is shown in Figure 5.



**Figure 5:** The percentage of pupils and their scores in question 5.

Further analysis of data in this question shows that, out of 804,324 pupils who had weak performance, 495,033 pupils, scored 0 mark. These pupils failed to answer the question correctly due to different reasons where in part (a), they failed to get the correct answer due to lack of knowledge on performing addition of numbers about money. Some of the pupils failed to add the digits of the numbers 2,570 and 1,650 correctly while some pupils wrote wrong answers as a result of failure to carry during addition. For instance, some of them wrote, sh.2,570 + sh.1,650 = 311,120. Apart from copying the wrong amount of the given money, they also lacked the skills to arrange properly the digits given before addition. Some of them wrongly wrote;

$$\begin{array}{r}
 2\ 5\ 7\ 0 \\
 +\ 1\ 5\ 0 \\
 \hline
 4\ 0\ 7\ 0
 \end{array}
 \quad \text{instead of arranging} \quad
 \begin{array}{r}
 2\ 5\ 7\ 0 \\
 +\ \quad 1\ 5\ 0 \\
 \hline
 2\ 7\ 2\ 0
 \end{array}$$

which could also be wrong because the number was wrongly copied.

$$\begin{array}{r}
 2\ 5\ 7\ 0 \\
 +\ 1\ 6\ 5\ 0 \\
 \hline
 4\ 2\ 2\ 0
 \end{array}$$

The correct arrangement and answer was

In part (b), the pupils failed to get the correct answer due to lack of knowledge and skills in subtraction. Their responses show that, they could not realize that after borrowing a group of tens from the place of

hundrends, the digit 7 is reduced to 6. For instance, one of the pupils wrote;

$$\begin{array}{r} 2 \ 7 \ 8 \ 0 \\ - \ 1 \ 8 \ 9 \ 0 \\ \hline 4 \ 6 \ 7 \ 0 \end{array}$$

. Thus they added instead of subtracting as follows:

$$\begin{array}{r} 2 \ 7 \ 8 \ 0 \\ - \ 1 \ 8 \ 9 \ 0 \\ \hline 8 \ 9 \ 0 \end{array}$$

In part (c), the pupils failed to get the correct answer due to lack of knowledge on multiplication involving money. They ignored some important steps. For instance, some pupils did not multiply 5 by 2

$$\begin{array}{r} 2 \ 0 \ 0 \\ \times \quad 2 \ 5 \\ \hline 0 \ 0 \\ + \ 4 \ 0 \ 0 \\ \hline 4 \ 0 \ 0 \ 0 \end{array}$$

when multiplying 200 by 25, some of them wrote;

instead of writing;

$$\begin{array}{r} 2 \ 0 \ 0 \\ \times \quad 2 \ 5 \\ \hline 4 \ 0 \ 0 \\ + \ 1 \ 0 \ 0 \ 0 \\ \hline 5 \ 0 \ 0 \ 0 \end{array}$$

Other pupils ignored the instructions of the question. Instead of multiplying shs. 300 by shs. 25, they added these amounts, that is shs.300+shs.25=shs.325. In part (d), the pupils failed to get the correct answer due to lack of skills on addition in solving word problems. The analysis of data shows that some of the pupils wrote shs.(15,000-5,000)=shs.10,000 instead of adding shs. 5,000 and shs. 15,000. Some pupils did not know the difference between five

thousands and fifteen thousands because they wrongly wrote as follows;

$$\begin{array}{r} 5 \ 0 \ 0 \ 0 \\ + \ 5 \ 0 \ 0 \ 0 \\ \hline 1 \ 0 \ 0 \ 0 \ 0 \end{array}$$

while they were required to write as follows;

$$\begin{array}{r} 1 \ 5 \ 0 \ 0 \ 0 \\ - \ 5 \ 0 \ 0 \ 0 \\ \hline 2 \ 0 \ 0 \ 0 \ 0 \end{array}$$

In part (e), the pupils failed to get the correct answer due to lack of skills on the concepts from the given word problem and multiplication. They could not realize the requirements of the question, because instead of multiplying shs. 7,000 by 5 they added 1 and 5 to 7,000 to get 7006 which is an incorrect answer. Extract 5.1 is an example of one of incorrect answers.

No	Question	Working Space	Answer
5 (a)	Add; shs. 2570 + shs. 1650 =	$\begin{array}{r} \text{Sh } 2570 \\ \text{Sh } + 1650 \\ \hline 4020 \end{array}$	ANSWER=4076
(b)	Subtract; shs. 2780 - shs. 1890 =	$\begin{array}{r} \text{Sh } 2780 \\ \text{Sh } - 1890 \\ \hline 890 \end{array}$	ANSWER=1110
(c)	Multiply  shs 200 x     25 _____ _____ _____	$\begin{array}{r} \text{Shs } 200 \\ \times \quad 25 \\ \hline 400 \\ + 0100 \\ \hline 0500 \end{array}$	=0500

(d)	Kalunde gave his grandmother fifteen thousand shillings. Sara also gave her five thousand shillings. How much money did the grandmother receive all together?	$\begin{array}{r} 5000 \\ + 5000 \\ \hline 10000 \end{array}$	10000
(e)	One table is sold at sh. 7,000. How much money will 5 tables be sold?	$\begin{array}{r} 7,000 \\ + 1 \\ \hline 7006 \end{array}$	7006

Extract 5.1: A sample of a incorrect answer given by one of the pupils.

Extract 5.1 shows that the pupils lacked knowledge about mathematical operations on numbers representing money. In part (a), the pupil failed to add correctly the given four digits representing money, in part (b) the pupil failed to subtract the four digits representing money in a straight line. The pupil also lacked knowledge about multiplication of digits representing money in parts (c) and (e) where the pupils were supposed to multiply the digits 200 by 25 and 7,000 by 5 respectively.

Further analysis of data shows that out of 859,861 pupils whose performance was good on this question, 163,443 pupils, equivalent to 9.8 percent were able to answer this question correctly hence scored all marks. These pupils had adequate knowledge to; perform addition, subtraction and multiplication of numbers representing money and solve the given word problems about money as shown in Extract 5.2.

No	Question	Working Space	Answer
5.(a)	Add; shs. 2570 + shs. 1650 =	$\begin{array}{r} 2570 \text{ shs} \\ + 1650 \text{ shs} \\ \hline 4220 \text{ shs} \end{array}$	4220 shs

(b)	Subtract; shs. 2780 – shs. 1890	$\begin{array}{r} 2780 \text{ shs} \\ - 1890 \text{ shs} \\ \hline 890 \text{ shs} \end{array}$	890 shs
(c)	Multiply  shs 200 x 25	$\begin{array}{r} \text{sh } 200 \\ \times 25 \\ \hline 1000 \\ 4000 \\ \hline 5000 \end{array}$	shs = 5000
(d)	Kalunde gave his grandmother fifteen thousand shillings. Sara also gave her five thousand shillings. How much money did the grandmother receive all together?	$\begin{array}{r} 15,000 \text{ shs} \\ + 5,000 \text{ shs} \\ \hline 20,000 \end{array}$	20,000 shs
(e)	One table is sold at sh. 7,000. How much money will 5 tables be sold?	$\begin{array}{r} 7000 \\ \times 5 \\ \hline 35000 \end{array}$	= 35,000 shs

Extract 5.2: A sample of the correct answers from one of the pupils.

Extract 5.2 shows that a pupil managed to add and subtract the values of the numerals in part (a) and (b). Similarly, this pupil managed to multiply correctly the given numerals representing money in parts (c) and (e). In part (d) the pupil correctly arranged the given numerals and add correctly to attain the correct answer.

### 3.0 ANALYSIS OF PUPILS' PERFORMANCE IN EACH COMPETENCE

The analysis of pupil' performance regarding each competence shows that, *Application of the Concept of Pattern of Numbers to Solve Problems in Everyday Life* is the only competence that had a good performance. The competences about *Application of the Concept of Shapes and Figures to Solve Different Problems*, *Application of the Concept of Numbers to Communicate in Different Contexts*, *Application of Mathematical operations on Numbers* and *Application of Mathematical operations on Money* had an average performance.

The pupils' performance for each question is shown in the *Attachment* of this report where the colours used represent the standards of performance. In the attachment; the green colour represents good performance and yellow colour represents average performance.

#### **4.0 CONCLUSION**

In general, the performance of pupils in Mathematics subject Assessment in 2019 was 74.02 percent, showing that it has decreased by 8.78 percent compared to the performance of 2018 which was 82.80 percent.

The analysis of pupil's responses in Mathematics shows that, there was no weak performance in any competencies which were assessed. Further analysis of pupils' responses shows that, some of the reasons that contributed to pupils' failure to perform very good in the four questions which had average performance include; lack of enough competence to perform mathematical operations correctly and inability to apply various arithmetic facts and correct formulae in answering questions. Also failure to understand the requirements of the question and lack of adequate knowledge on mathematical language for solving word problems.

#### **5.0 RECOMMENDATIONS**

In order to improve the performance in Mathematics subject in future Standard Four Pupils in the National Assessment the following are recommended:

- (a) Teachers should timely complete the teaching and learning objectives right from Standard One by using various teaching and learning aids available in their surroundings based on the Mathematics syllabus demand.
- (b) Teachers should assess the pupils' ability regularly on every specific competence by providing adequate exercises in order to improve their competence in answering questions.
- (c) Teachers should apply various ways to assist the pupils according to their reading, writing and counting abilities.



## Appendix

### Summary of Analysis of Performance for Each Competence in Tabular Form (SFNA - 2019)

S/N	Competences	Question Number	Number of Pupils with Good Performance	Percentage (%) of Pupils with Good Performance	Remarks on Performance
1	Application of the Concept of Pattern of Numbers to Solve Problems in Everyday Life	2	1,126,388	67.7	Good
2	Application of the Concept of Shapes and Figures to Solve Different Problems	4	995,558	59.8	Average
3.	Application of the Concept of Numbers to Communicate in Different Contexts	1	909,824	54.7	Average
4	Application of Mathematical operations on Numbers	3	907,553	54.5	Average
5.	Application of Mathematical operations on Money	5	859861	51.7	Average

