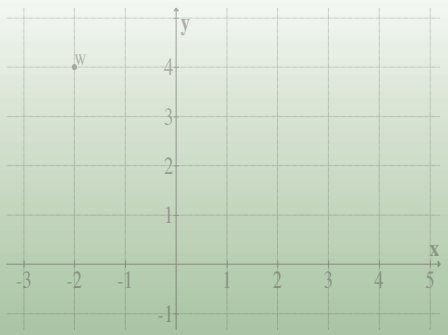
THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CANDIDATES' ITEM RESPONSE ANALYSIS REPORT FOR THE PRIMARY SCHOOL LEAVING EXAMINATION (PSLE) 2018



MATHEMATICS

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FOREWORD

The Candidates' Response Analysis Report for Primary School Leaving Examination (PSLE) in the year 2018 has been prepared to give feedback to pupils, teachers, curriculum developers, policy makers and other educational stakeholders on how the candidates answered the examination questions.

The analysis of the candidates' responses shows that, the topics which were well performed were *Whole Numbers*, *Squares and Square Roots*, *Decimals*, *Fractions* and *Roman Numbers*. Also, the analysis shows that, the topics of *Coordinate Geometry, Units, Percentages, Statistics, Geometry*, *Algebra* and *Money* were averagely performed. However, only one topic on *Integers* had weak performance. The weak performance was mainly caused by failure to apply the BODMAS rule in mathematical operations involving positive and negative numbers.

Further analysis shows that, in the topics which were averagely performed, some of the candidates had inadequate knowledge in performing matheamatical operations, using appropriate concepts and correct formulae in answering questions, solving equations and word problems.

The National Examinations Council of Tanzania believes that this report will be useful to improve the candidates' performance in future Mathematics examinations. Lastly, the National Examinations Council of Tanzania would like to thank all the examination officers and other experts who participated in preparing this report.

Dr. Charles E. Msonde

EXECUTIVE SECRETARY

1.0 INTRODUCTION

The Primary School Leaving Examination in the Mathematics subject was held on 05th of September 2018. In that sitting, a total of 957,904 candidates were registered, out of which 944,151 (98.56%) candidates sat for Mathematics examination. The analysis of the Mathematics subject examination results shows that, 622,718 (66.02%) candidates passed the examination. In 2017, out of 909,888 candidates who sat for the Mathematics examination, 492,257 (54.10%) candidates passed. These results show that the performance in 2018 has increased by 11.92 percent when compared to 2017.

The 2018 Primary School Leaving Examination in the Mathematics subject consisted of Sections A and B, with a total of 45 questions covering mathematical operations, figures and word problems. Section A had 40 multiple choice questions worth 01 mark each, whereas Section B had 5 short answer questions each carrying 02 marks.

The candidates were instructed to answer all questions in both sections. In Section A, the candidates were required to work out the answer in each question and then shade the letter of the correct answer in the special answer sheets (OMR) provided. In Section B, they were required to work out the answer in each question and show the working in the space provided.

The candidates' responses in Section A were analysed and their performance categorised in three classes according to the percentage of the candidates who correctly answered the questions as follows: $60-100$ for good performance, $40-59$ for average performance and

$0-39$ for weak performance. In Section B, those performance classes apply to the percentage of candidates who scored at least 50 percent of the marks for each question, that is, from 1 to 2 marks. This analysis excluded the responses of 6,424 candidates who rewrote the mathematics examination.

The category "Others" in the tables and figures used in this anaysis report denotes the candidates who either chose more than one multiple choice options or did not respond to the question. Also in interpreting the analysis figures and tables used in this report, an asterisk (*) is placed beside the correct answer for the multiple choice questions. Moreover, in the analysis tables and figures, the green, yellow and red colours represent good, average and weak perfomance respectively.

Finally, the report has shown the comparison of candidates' performance topic-wise in 2017 and 2018; and provides recommendations for improving the candidates' performance in future Mathematics examinations.

2.0 ANALYSIS OF THE CANDIDATES' RESPONSES

The analysis of the candidates' responses has been done in each examined item.

In Section A, the candidates were required to work out the answer for each item and choose the correct answer among the given five options. The analysis made use of the statistics of the number of candidates who gave correct answers, those who chose distractors, those who omitted the questions and those who did not follow the given instructions.

In Section B, the candidates were required to show the working clearly for each short answer question in the space provided. In this section, the analysis was based on the number of candidates who scored 1.5 or 2 marks, those who scored 1 mark, those who scored 0 or 0.5 mark and those who either omitted the question or did not follow the given instructions.

2. 1 Section A: Multiple Choice Items

Question 1: $1{,}236 \div 4 =$

A 39 B 309 C 63 D 306 E 49.

This question tested the candidates' ability to divide whole numbers. The number and percentage of candidates who chose the given options are shown in Table 1.

Table 1: Number and Percentage of Candidates in Each Option

Option	A	B*	C	D	E	Others
Number of Candidates	193,354	633,053	36,166	46,725	24,308	4,377
Percentage of Candidates	20.6	67.5	3.9	5.0	2.6	0.4

The analysis of data in this question shows that, the performance was good as 633,053 (67.5%) candidates were able to divide 1,236 by 4, hence chose the correct answer B. One of the methods used to get the correct answer was to divide by using long method as follows:

$$
\begin{array}{r}
309 \\
4\overline{)\,1236} \\
\underline{-12} \\
36 \\
\underline{-\,36} \\
0
\end{array}
$$

On the other hand, 300,553 (32.1%) candidates chose incorrect responses A, C, D or E. These candidates lacked knowledge and skills to divide whole numbers correctly. For example, the candidates who chose A, divided 12 by 4 to get 3 and 36 by 4 to get 9, then concluded that 1236÷4=39. This mistake was due to failure of candidates to divide each digit of the number 1236 by 4 and lack of knowledge about multiplication table. Figure 1 shows the percentage of candidates and their choices for each option.

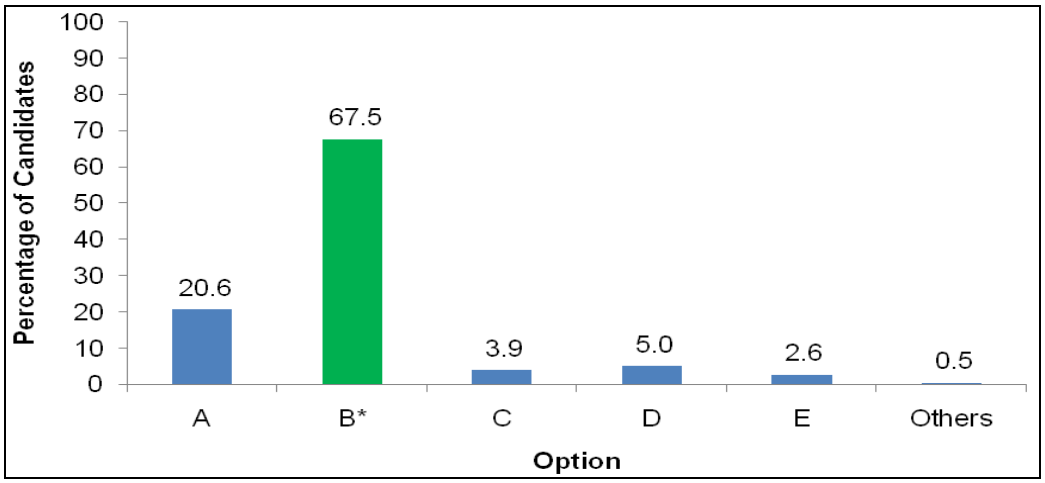


***Figure 1**: Candidates' Performance in Question 1*.

Question 2: Write $\left(\frac{7}{12}+\frac{2}{12}\right)$ in a simplified fraction.

A $\frac{3}{4}$ B $\frac{9}{12}$ C $\frac{9}{24}$ D $\frac{3}{8}$ E $\frac{2}{12}$.

This question tested the candidates' ability to add and simplify fractions. Table 2 shows the number and percentage of candidates' choices for each option.

Table 2: Number and Percentage of Candidates in Each Option

Option	**A***	**B**	**C**	**D**	**E**	**Others**
Number of Candidates	367,924	327,542	170,697	37,535	29,014	5,271
Percentage of Candidates	39.2	34.9	18.2	4.0	3.1	0.6

Table 2 shows that, the candidates' performance in this question was weak as a total of 564,788 (60.2%) candidates failed to add or simplify the fractions correctly and chose the incorrect response B, C, D or E. For example, the candidates who chose distractor B were able to add the fractions, that is, $\left(\frac{7}{12}+\frac{2}{12}\right)=\frac{7+2}{12}=\frac{9}{12}$ but did not simplify $\frac{9}{12}$ to get the required answer. Likewise, the candidates who chose distractor C lacked knowledge of adding fractions. They incorrectly added the numerators and denominators of the given fractions separately as follows: $\left(\frac{7}{12}+\frac{2}{12}\right)=\frac{7+2}{12+12}=\frac{9}{24}$.

In spite of the poor performance, 367,924 (39.2%) candidates were able to answer this question correctly and chose the correct answer A after performing the following calculations;

$$\left(\frac{7}{12}+\frac{2}{12}\right)=\frac{7+2}{12}=\frac{9}{12}=\frac{3}{4}.$$

This shows that, they had knowledge and skills to add and simplify fractions. Figure 2 shows the percentage of candidates and their choices.

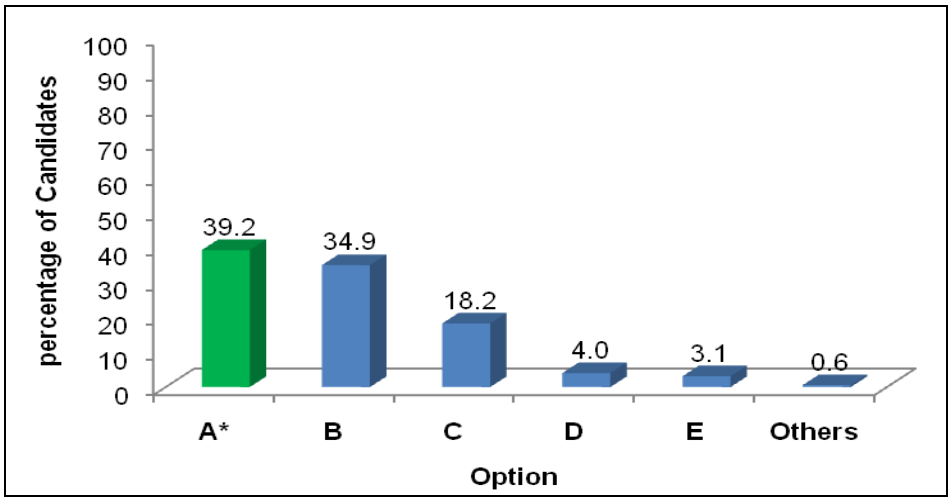


***Figure 2**: Candidates' Performance in Question 2*.

Question 3: $269+1{,}731=$

A 1,800 B 1,900 C 1,990 D 1,999 E 2,000.

This question assessed candidates' ability to add whole numbers with different number of digits. Table 3 shows the number and percentage of candidates with their choices in each option.

Table 3: Number and Percentage of Candidates in Each Option

Option	**A**	**B**	**C**	**D**	**E***	**Others**
Number of Candidates	16,755	34,308	34,583	17,924	829,514	4,899
Percentage of Candidates	1.8	3.7	3.7	1.9	88.4	0.5

The analysis of data shows that, this question was best performed in section A compared to other questions as 829,514 (88.4%) candidates were able to answer the question correctly. These candidates added correctly the ones, tens, hundreds and thousands of digits of the given numbers and chose the correct answer E. The correct answer was obtained as follows;

$$\begin{array}{r} 1\ 7\ 3\ 1 \\ +\ 2\ 6\ 9 \\ \hline 2\ 0\ 0\ 0 \end{array}$$

However, 103,570 (11.1%) candidates failed to find the correct answer and hence chose distractor A, B, C or D. This was due to lack of skills required to perform addition by carrying. For instance, the candidates who chose distractor B did not carry 1 group of hundreds obtained from tens to hundreds as follows:

$$\begin{array}{r} 1\ 7\ 3\ 1 \\ +\ 2\ 6\ 9 \\ \hline 1\ 9\ 0\ 0 \end{array}$$

Likewise, the candidates who chose distractor C did not carry 1 group of tens from ones to tens as follows:

$$\begin{array}{r} 1\ 7\ 3\ 1 \\ +\ 2\ 6\ 9 \\ \hline 1\ 9\ 9\ 0 \end{array}$$

Question 4: $4\frac{4}{5} \div 1\frac{1}{5} =$

A 2 B 3 C 4 D 5 E 6.

The question tested the candidates' ability to divide mixed fractions.

Table 4 shows the number and percentage of candidates with their choices in each option.

Table 4: Number and Percentage of Candidates in Each Option

Option	**A**	**B**	**C***	**D**	**E**	**Others**
Number of Candidates	50,239	64,327	681,204	67,844	67,756	6,639
Percentage of Candidates	5.4	6.9	72.6	7.2	7.2	0.7

The performance in this question was good as analysis of data shows that, a total of 681,204 (72.6%) candidates were able to divide the given fractions and chose the correct answer C. These candidates obtained the correct answer through the following steps; firstly, they changed the mixed fractions into improper fractions and secondly they multiplied the first fraction by the reciprocal of the second fraction, and lastly, simplified the resulting fraction into whole number, that is;

$$4\frac{4}{5} \div 1\frac{1}{5} = \frac{(5\times 4)+4}{5} \div \frac{(5\times 1)+1}{5} = \frac{24}{5} \div \frac{6}{5} = \frac{24}{5} \times \frac{5}{6} = \frac{120}{30} = 4.$$

On the other hand, 250,166 (26.7%) candidates lacked knowledge of dividing mixed fractions. Eventually, they chose incorrect responses A, B, D or E. For instance, the candidates who chose the distractor E did not divide the mixed fractions, instead they added as follows;

$$4\frac{4}{5} + 1\frac{1}{5} = \frac{24}{5} + \frac{6}{5} = \frac{24+6}{5} = \frac{30}{5} = 6.$$

Question 5: $1{,}509 - 728 =$

A 581 B 681 C 771 D 781 E 881.

This question tested the candidates' ability to subtract whole numbers. Table 5 shows the percentage of candidates and their responses.

Table 5: Number and Percentage of Candidates in Each Option

Option	A	B	C	D*	E	Others
Number of Candidates	23,964	36,027	38,103	775,828	59,757	4,304
Percentage of Candidates	2.6	3.8	4.1	82.7	6.4	0.5

Table 5 shows that, the performance in this question was good as 775,828 (82.7%) candidates were able to use correctly the knowledge of subtracting whole numbers to obtain the correct answer D.

On the other hand, 16.9 percent of the candidates failed to get the correct answer because they lacked knowledge and skills to perform subtraction by borrowing. For example, the candidates who chose E did not remember that they borrowed 1 from the hundreds place value while performing subtraction in tens place value. This mistake led to obtain an incorrect answer 881 instead of 781.

Question 6: $7\frac{3}{5} - 2\frac{1}{2} =$

A 3 B $3\frac{2}{5}$ C $3\frac{1}{10}$ D $4\frac{1}{10}$ E $5\frac{1}{10}$.

This question tested the candidates' understanding on subtraction of mixed fractions. The number and percentage of candidates with their responses are shown in Table 6.

Table 6: Number and Percentage of Candidates in Each Option

Option	A	B	C	D	E*	Others
Number of Candidates	33,212	64,457	54,936	63,315	715,627	6,436
Percentage of Candidates	3.5	6.9	5.9	6.8	76.3	0.7

The question had good performance as more than three quarters of the candidates, that is 715,627 (76.3%) were able to subtract the fractions and chose the correct answer E as shown in Table 6. The answer was obtained through the following steps;

$$7\frac{3}{5}-2\frac{1}{2}=(7-2)+\left(\frac{3}{5}-\frac{1}{2}\right)=5+\frac{6-5}{10}=5+\frac{1}{10}=5\frac{1}{10}$$ or

$$7\frac{3}{5}-2\frac{1}{2}=\frac{(5\times 7)+3}{5}-\frac{(2\times 2)+1}{2}=\frac{38}{5}-\frac{5}{2}=\frac{76-25}{10}=\frac{51}{10}=5\frac{1}{10}.$$

However, further analysis of data shows that, a total of 215,920 (23.1%) candidates chose among the distractors A, B, C or D. This shows that the candidates lacked knowledge on subtraction of mixed fractions.

Question 7: $78\times 952=$

A 74,256 B 70,756 C 74,246 D 74,156 E 73,856.

The question tested the candidates' ability to multiply whole numbers. Table 7 shows the number and percentage of candidates with their choices in each option.

Table 7: Number and Percentage of Candidates in Each Option

Option	A*	B	C	D	E	Others
Number of Candidates	669,206	60,028	77,381	56,570	65,538	9,260
Percentage of Candidates	71.3	6.4	8.2	6.0	7.0	0.9

The analysed data shows that, the performance in this question was good as 669,206 (71.3%) candidates were able to get the correct answer A. This shows that, these candidates had adequate knowledge and skills in multiplying the whole numbers. One of the methods used to get the answer was the vertical multiplication method, that is,

$$
\begin{array}{rrrrr}
 & & & 7 & 8 \\
 & \times & 9 & 5 & 2 \\
\hline
 & & & 1 & 5 & 6 \\
 & & 3 & 9 & 0 & \\
+ & 7 & 0 & 2 & & \\
\hline
 & 7 & 4 & 2 & 5 & 6 \\
\hline
\end{array}
$$

On the other hand, 259,517 (27.6%) candidates chose incorrect answer B, C, D or E because they either did not understand how to multiply whole numbers by using vertical method or had poor arithmetic skills. For example, those who chose distractor D made mistakes in addition as shown below;

$$
\begin{array}{rrrrr}
 & & & 7 & 8 \\
 & \times & 9 & 5 & 2 \\
\hline
 & & & 1 & 5 & 6 \\
 & & 3 & 9 & 0 & \\
+ & 7 & 0 & 2 & & \\
\hline
 & 7 & 4 & 1 & 5 & 6 \\
\hline
 & & & \uparrow & &
\end{array}
$$

mistake in addition

These candidates added 1 + 9 + 2 and get 11 instead of 12. This mistake led them to choose an incorrect answer D instead of A.

Question 8: If $P = 5$ and $Q = 4$, find the value of $\left(P^2\right) \times \left(Q^2\right)$.

A 54 B 108 C 400 D 200 E 800.

This question tested candidates' ability to find the product of squares of whole numbers. Table 8 shows the number and percentage of candidates who chose the options A to E.

Table 8: Number and Percentage of Candidates in Each Option

Option	A	B	C*	D	E	Others
Number of Candidates	105,374	79,423	620,468	74,418	48,104	10,196
Percentage of Candidates	11.2	8.5	66.1	7.9	5.1	1.1

The analysis of data shows that this question had good performance as 620,468 (66.1%) candidates were able to calculate and chose the correct answer C. The answer was obtained as follows:

$\left(P^2\right)\times\left(Q^2\right)=(P\times Q)^2=(5\times 4)^2=20^2=20\times 20=400$ or

$\left(P^2\right)\times\left(Q^2\right)=(5^2)\times(4^2)=25\times 16=400.$

Further analysis revealed that, 32.7 percent of the candidates who chose incorrect answer A, B, D or E failed to understand that the square of a number equals to the multiplication of the number by itself.

Question 9: Mr. Matata was born in 1961. Write this year in roman numbers.

A MMCLXI B MCMLXI C MCMXLI D MCMCXI

E MXMLXI.

The question tested the candidates' knowledge to convert normal (arabic) numbers into roman numbers. The number and percentage of candidates and their responses are shown in Table 9.

Table 9: Number and Percentage of Candidates in Each Option

Option	A	B*	C	D	E	Others
Number of Candidates	55,563	628,750	98,807	63,678	82,231	8,954
Percentage of Candidates	5.9	67.0	10.5	6.8	8.8	1.0

The analysis of data shows that, the performance in this question was good as 628,750 (67%) candidates were able to convert the given

arabic number into a roman number and chose the correct answer B. This means that, these candidates had the skills to correctly convert 1961 into Roman numbers by using I = 1, X = 10, L = 50, C = 100 and M = 1000 such that 1961 = 1000 (M) + 900 (CM) + 60 (LX) + 1 (I) = MCMLXI.

Further analysis shows that, 300,279 (32%) candidates failed to answer correctly this question and chose distractor A, C, D or E. These candidates lacked knowledge on how to convert normal numbers into roman numbers. For instance, those who chose distractor C wrote 1961 as MCMXLI (1941) instead of MCMLXI (1961).

Question 10: $1.9 - 0.06 =$

A 0.94 B 1.94 C 1.86 D 1.84 E 1.96.

This question tested the candidates' ability to subtract the decimal numbers. The number and percentage of candidates with their responses in each option are shown in Table 10.

Table 10: Number and Percentage of Candidates in Each Option

Option	A	B	C	D*	E	Others
Number of Candidates	54,462	52,144	39,055	641,693	142,920	7,709
Percentage of Candidates	5.8	5.6	4.2	68.4	15.2	0.8

Table 10 shows that, the performance of candidates in this question was good as 641,693 (68.4%) candidates were able to subtract the numbers and chose the correct answer D. The answer was obtained as follows;

$$\begin{array}{r} 1.90 \\ -\ 0.06 \\ \hline 1.84 \end{array}$$

However, 288,581 (30.8%) candidates lacked knowledge and skills required to subtract decimals and therefore chose incorrect answer A, B, C or E. For instance, those who chose distractor A, B or C lacked knowledge and skills of subtraction by regrouping. Those who chose B, forgot to reduce 9 by 1 in the tenth column. They performed as follows;

$$\begin{array}{r} 1.90 \\ -\ 0.06 \\ \hline 1.94 \\ \hline \uparrow \end{array}$$

subtraction error

Also, those who chose distractor E, did not follow the given instruction as they added the given decimals contrary to the requirement of the question as follows;

$$\begin{array}{r} 1.90 \\ +\ 0.06 \\ \hline 1.96 \\ \hline \end{array}$$

Question 11: Change 44% in simplified fraction.

A $\frac{44}{100}$ B $\frac{22}{25}$ C $\frac{11}{50}$ D $\frac{22}{50}$ E $\frac{11}{25}$.

The question tested the candidates' ability to change the percentage of a number into a simplified fraction. The number and percentage of candidates with their responses in each option are presented in Table 11.

Table 11: Number and Percentage of Candidates in Each Option

Option	A	B	C	D	E*	Others
Number of Candidates	224,420	84,907	58,412	79,198	482,932	8,114
Percentage of Candidates	23.9	9.1	6.2	8.4	51.5	0.9

The analysis of data shows that, the performance in this question was average since, 482,932 (51.5%) candidates were able to work out the answer and hence chose the correct answer E. The candidates were able to identify that $44\% = \frac{44}{100}$ then simplified the fraction to $\frac{11}{25}$ as required.

On the other hand, a total of 446,937 (47.6%) candidates were unable to change the percentage into a simplified fraction, hence chose incorrect answer A, B, C, or D. Further analysis shows that, 32.3 percent of those who chose the incorrect answers A and D did not simplify the fractions as required. Also, those who chose B and C had misconception of percentage. For instance, the candidates who chose distractor B, considered 44% as 44 divide by 50, that is $\left(\frac{44}{50} = \frac{22}{25}\right)$ and those who chose distractor C considered 44% as 44 divide by 200, that is $\left(\frac{44}{200} = \frac{11}{50}\right)$. Figure 3 shows the percentage of candidates and their responses in each option.

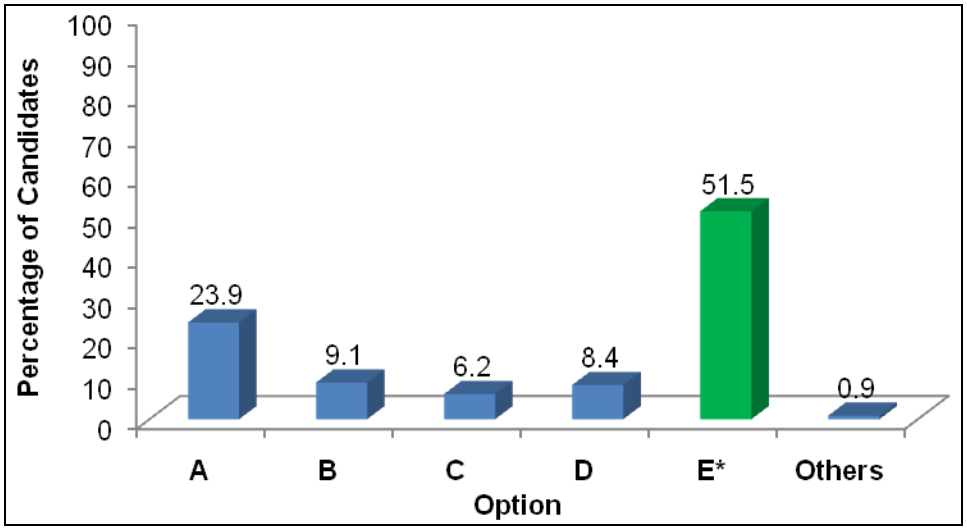


***Figure 3**: Candidates' Performance in Question 11.*

Question 12: Find the value of 49^2.

A 2,401 B 2,301 C 1,301 D 98 E 492.

This question assessed the candidates' ability to find the square of a whole number. The number and percentage of candidates with their responses are shown in Table 12.

Table 12: Number and Percentage of Candidates in Each Option

Option	**A***	**B**	**C**	**D**	**E**	**Others**
Number of Candidates	618,195	80,080	47,805	128,381	53,742	9,780
Percentage of Candidates	65.9	8.5	5.1	3.7	5.7	1.0

The analysis of data shows that, the performance of this question was good. A total of 618,195 (65.9%) candidates were able to find the value of 49^2 and chose the correct answer A. The correct answer was obtained by multiplying 49 by 49, that is, $49^2 = 49 \times 49 = 2,401$.

On the other hand, the analysis shows that 310,008 (33.1%) candidates chose distractor B, C, D or E. These candidates lacked knowledge on squares of whole numbers. For example, the candidates who chose distractor D, wrongly computed the value of 49^2 by multiplying 49 by 2 to get 98, that is, $49^2 = 49 \times 2 = 98$.

Question 13: $3-\left(6-^{-}8\right)=$

A 17 B -1 C -11 D 1 E 11

This question tested the candidates' ability to use BODMAS rule to simplify the given expression. The number and percentage of candidates who chose the options are shown in Table 13.

Table 13: Number and Percentage of Candidates in Each Option

Option	A	B	C*	D	E	Others
Number of Candidates	135,407	172,634	376,790	133,032	111,681	8,439
Percentage of Candidates	14.4	18.4	40.2	14.2	11.9	0.9

The analysis of data shows that, a total of 552,754 (58.9%) candidates failed to perform mathematical operations to simplify the expression and hence chose an incorrect answer A, B, D or E. For example, the candidates who chose distractor A, made a mistake by adding all numbers in the given expression that is; $3-\left(6-^{-}8\right)=3+6+8=17$. This shows that they lacked skills in performing mathematical operations on integers.

However, further analysis shows that, the performance of candidates in this question was average since 376,790 (40.2%) candidates were able to find correctly the value of the expression and chose the correct option C. These candidates had the skills required to simplify the given expression by using BODMAS rule; that is $3-(6-^{-}8)=3-(6+8)=3-14=-11$. The percentage of candidates and their responses in each option are shown in Figure 4.

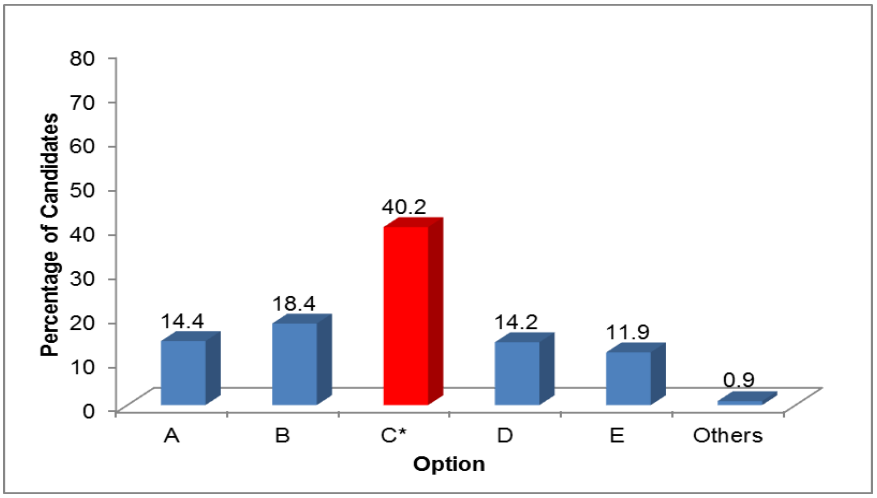


Figure 4: *Percentage of candidates and their responses in question 13.*

Question 14: How many even numbers are between 73 and 81?

A 7 B 6 C 5 D 4 E 3

This question tested the candidates' knowledge about the concept of even numbers. Table 14 shows the number and percentage of candidates with their responses in each option.

Table 14: Number and Percentage of Candidates in Each Option

Option	**A**	**B**	**C**	**D***	**E**	**Others**
Number of Candidates	50,660	49,843	77,179	592,751	161,349	6,201
Percentage of Candidates	5.4	5.3	8.2	63.2	17.2	0.7

The analysis of data shows that, the performance in this question was good. A total of 592,751 (63.2%) candidates were able to identify the even numbers between 73 and 81, and chose the correct answer D. These candidates listed the numbers between 73 and 81 which are; 74, 75, 76, 77, 78, 79 and 80 and identified that 74, 76, 78 and 80 are even numbers. This shows that they had knowledge on the properties of even numbers, that is, an even number is divisible by 2.

In spite of this good performance, the data shows that, 339,031 (36.1%) candidates failed to identify the even numbers between 73 and 81, hence chose distractor A, B, C or E. For instance, the candidates who chose distractor E, did not know the difference between even and odd numbers.

Question 15: Multiply 8 kg 50 gm by 5.

A 40 kg 25 gm B 40 kg 250 gm C 42 kg 250gm D 42kg 225 gm E 40 kg 455 gm.

This question tested the candidates' ability to multiply the units of mass by a whole number. The number and percentage of candidates who chose the options are shown in Table 15.

Table 15: Number and Percentage of Candidates in Each Option

Option	A	B*	C	D	E	Others
Number of Candidates	69,173	721,557	74,105	39,976	28,054	5,118
Percentage of Candidates	7.4	76.9	7.9	4.3	3.0	0.5

The analysis of data shows that, the performance of this question was good. A total of 721,557 candidates which is equivalent to 76.9 percent answered this question correctly and chose the correct answer B. The correct answer was obtained as follows;
(8kg 50gm)x5 = (8kg x 5) (50gm x 5) =40 kg 250gm.

On the other hand, the analysis of data shows that, 211,308 candidates equivalent to 22 percent failed to answer this question correctly and chose distractor A, C, D or E. These candidates lacked skills of multiplying the units of mass by a whole number. For example, the candidates who opted for distractor A, multiplied 50gm

by 5 and got 25gm instead of 250gm. Likewise, those who chose C multiplied 8kg by 5 and got 42kg instead of 40kg.

Question 16: Write the missing number in the following sequence:
$70, 85, 100, ..., 130.$

A 101 B 105 C 108 D 11 E 115

This question tested the skills of candidates to identify the missing numbers in a sequence of whole numbers. The number and percentage of candidates who chose the options are shown in Table 16.

Table 16: Number and Percentage of Candidates in Each Option

Option	A	B	C	D	E*	Others
Number of Candidates	42,874	92,401	52,673	69,233	673,426	7,376
Percentage of Candidates	4.6	9.9	5.6	7.4	71.8	0.8

Table 16 shows that, the performance in this question was good. A total of 673,426 (71.8%) candidates answered this question correctly and chose the correct answer E. The candidates calculated the difference of two consecutive numbers, that is, 85-75 = 15, 100-85 = 15 and used it to get the missing number: 100+15 = 115.

However, further analysis shows that, 257,181 (27.5%) candidates could not identify the missing number and chose distractor A, B, C or D. For example, some of the candidates who chose B, thought the missing number must end with 5 that is why they chose 105. Others considered that the difference between consecutive numbers is 5 instead of 15 and hence added, 100 +5 = 105.

Question 17: If $7m - \frac{1}{3} = 2,$ find the value of m.

A $\frac{2}{3}$ B $\frac{7}{3}$ C $\frac{2}{7}$ D $\frac{1}{3}$ E $\frac{1}{7}$

This question tested the ability of candidates to determine the value of the unknown m that satisfy the equation. Table 17 shows the number and percentage of candidates with their responses in each option.

Table 17: Number and Percentage of Candidates in Each Option

Option	A	B	C	D*	E	Others
Number of Candidates	134,009	149,207	162,627	358,937	117,787	15,416
Percentage of Candidates	14.3	15.9	17.3	38.3	12.6	1.6

Table 17 shows that, the performance in this question was weak. A total of 563,630 (60.1%) candidates failed to find the value of m, hence they chose distractor A, B, C or E. In order to get the value of m, they were required to go through the following procedures; $7m-\frac{1}{3}=2$ then, $7m=2+\frac{1}{3}$ or $7m=\frac{2}{1}+\frac{1}{3}$ so that, $7m=\frac{6+1}{3}=\frac{7}{3}$ or $7m=\frac{7}{3}$.

Therefore, $m=\frac{1}{3}$. A total of 358,937 candidates equivalent to 38.3 were able to find the value of *m* and chose the correct answer D. Figure 5 shows the percentage of candidates and their responses in each option.

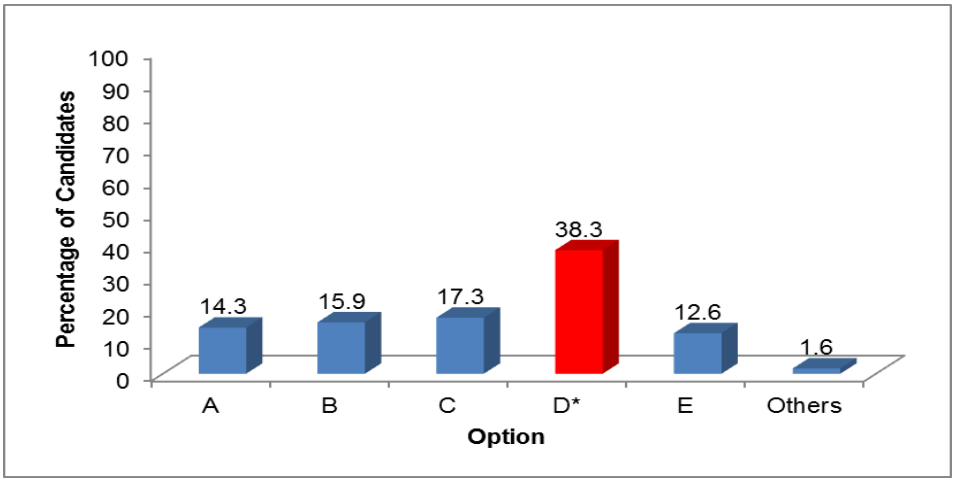


Figure 5: *Percentage of candidates and their responses in question 17.*

Question 18: Find the Greatest Common Factor (GCF) of 32 and 48.

A 16 B 12 C 8 D 4 E 2

This question tested the candidates' ability to find the Greatest Common Factor (GCF) of the given numbers. The number and percentage of candidates who chose the options are shown in Table 18.

Table 18: Number and Percentage of Candidates in Each Option

Option	A*	B	C	D	E	Others
Number of Candidates	580,245	86,085	132,392	59,390	71,845	8,026
Percentage of Candidates	61.9	9.2	14.1	6.3	7.6	0.9

The analysis of data in this question shows that, the performance was good. A total of 580,245 (61.9%) candidates were able to find the GCF of the two given numbers and chose the correct answer A. These candidates had enough skills to find the factors of each number and then selected the greatest common factor which divides the given numbers.

Further analysis shows that, 349,712 (37.3%) candidates lacked the skills of finding the Greatest Common Factor and chose distractor B, C, D or E. For instance, the candidates who chose C, D or E did not realize that 2, 4 or 8 divides 32 and 48 but are not the Greatest Common Factor of these numbers.

Question 19: $15.65 \times 12 =$

A 31.3 B 15.65 C 187.8 D 178.7 E 187.7

This question assessed the candidates' ability to multiply a decimal by a whole number. The number and percentage of candidates who chose the options are shown in Table 19.

Table 19: Number and Percentage of Candidates in each Option

Option	A	B	C*	D	E	Others
Number of Candidates	36,799	69,197	732,077	38,091	53,104	8,715
Percentage of Candidates	3.9	7.4	78.0	4.1	5.7	0.9

The analysis of data shows that, the performance of candidates in this question was good as a total of 732,077 (78.0%) candidates were able to choose the correct answer C. These candidates had enough knowledge on multiplication of decimals by whole numbers. To get the correct answer, the candidates multiplied the given numbers without considering the decimal point to obtain 18780. The correct answer was obtained by counting two decimal places from the right of the number 18780 to get 187.80 = 187.8.

However, the analysis also shows that, 197,191 (21,1%) candidates lacked knowledge of multiplying decimals by whole numbers, hence chose distractor A, B, D or E. For example, the candidates who chose

distractor B, multiplied the given decimal number by 1 to get $15.65 \times 1 = 15.65$ which is not the correct answer.

Question 20: $1\frac{4}{5} \times 3\frac{8}{9} =$

A $3\frac{1}{7}$ B 7 C $\frac{44}{14}$ D 8 E $4\frac{12}{14}$.

This question assessed the candidates' ability to perform mathematical operations on mixed fractions. The number and percentage of candidates who chose the options are shown in Table 20.

Table 20: Number and Percentage of Candidates in each Option

Option	A	B*	C	D	E	Others
Number of Candidates	103,256	619,151	68,243	54,643	82,531	10,159
Percentage of Candidates	11.0	66.0	7.3	5.8	8.8	1.1

Table 20 shows that, the performance of the candidates in this question was good, since 619,151 (66.0%) candidates multiplied the mixed fractions and chose the correct answer B. These candidates followed the steps in multiplying mixed fractions by changing them into improper fractions, then multiplying the resulting fractions and simplifying to get the correct answer as follows: $1\frac{4}{5} \times 3\frac{8}{9} = \frac{(1\times 5)+4}{5} \times \frac{(3\times 9)+8}{9} = \frac{9}{5} \times \frac{35}{9} = 7.$

On the other hand, the analysis also shows that, 308,673 (32.9%) candidates chose distractor A, C, D or E because they lacked knowledge of multiplying mixed fractions. For example, the candidates who chose distractor E lacked knowledge on performing operations

with mixed fractions and hence performed wrong calculations as follows: $1\frac{4}{5}\times 3\frac{8}{9}=(1+3)(\frac{4+8}{5+9})=4\frac{12}{14}$.

Question 21: Find the square root of (64×4).

A 4 B 8 C 16 D 32 E 64.

This question tested the candidates' ability to find the square root of a product of two numbers. Table 21 shows the number and percentage of candidates who chose the options.

Table 21: Number and Percentage of Candidates in each Option

Option	A	B	C*	D	E	Others
Number of Candidates	44,696	96,984	615,021	99,974	73,533	7,775
Percentage of Candidates	4.8	10.3	65.6	10.7	7.8	0.8

The analysis of data shows that, the performance in this question was good as 615,021 (65.6%) candidates managed to find the square root of (64×4) and chose the correct answer C. These candidates had adequate knowledge on the procedures for finding the square root of the product of two numbers. Some of them wrote: $\sqrt{64\times 4}=\sqrt{64}\times\sqrt{4}=8\times 2=16$ or $\sqrt{64\times 4}=\sqrt{256}=\sqrt{16^2}=16$.

Moreover, 315,187 (33.6%) candidates chose distractor A, B, D or E due to lack of skills on finding the square root of the product of two numbers. For example, the candidates who chose distractor D, worked out the square root of 64 only and multiplied it by 4 as follows: $\sqrt{64}\times 4=8\times 4=32$.

Question 22: If $M = -3$ and $N = -5$, find the value of $(-9 \times M \times N)$.

A –105 B 15 C -125 D –135 E 135.

This question tested the candidates' ability to find the value of the given expression. The number and percentage of candidates who chose the options are shown in Table 22 and Figure 6.

Table 22: Number and Percentage of Candidates in each Option

Option	A	B	C	D*	E	Others
Number of Candidates	62,773	126,877	89,474	454,487	194,388	9,984
Percentage of Candidates	6.7	13.5	9.5	48.5	20.7	1.1

The analysis of data shows that, a total of 473,512 (50.5%) candidates failed to find the value of the given expression which led them to choose distractor A, B, C or E. For example, the candidates who chose distractor E failed to understand that, the product of negative (-) and positive (+) integers is negative and therefore calculated; $(-9 \times M \times N) = {}^{-}9 \times {}^{-}3 \times {}^{-}5 = 135$ instead of $(-9 \times M \times N) = {}^{-}9 \times {}^{-}3 \times {}^{-}5 = {}^{-}135$. Also the candidates who chose B calculated the value of $M \times N$ that is; $-3 \times -5 = 15$ insted of $-9 \times M \times N$.

However, further analysis shows that, 454,487 (48.5%) candidates had enough knowledge on multiplication of integers, hence they calculate correctly the value of the given expression and chose the correct answer D. This question had an average performance.

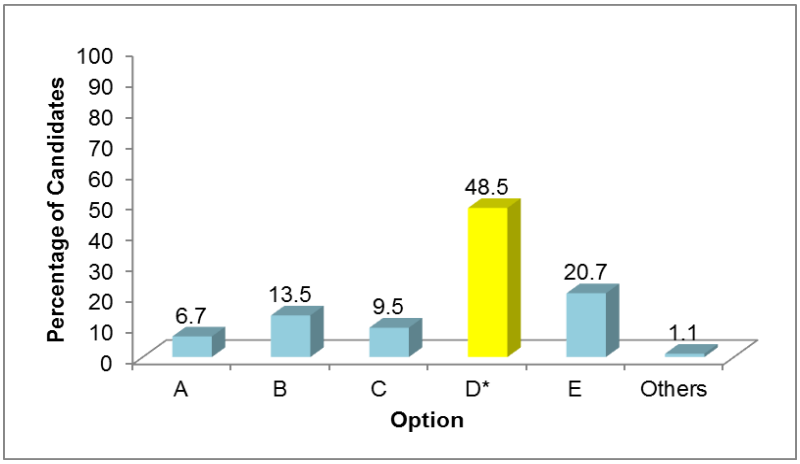
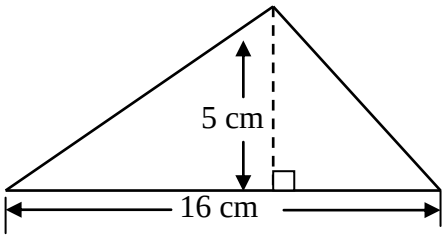


***Figure 6**: Percentage of candidates in question 22*

Question 23: Find the area of the following figure:



A $80\ cm^2$ B $40\ cm^2$ C $21\ cm^2$ D $20\ cm^2$ E $160\ cm^2$.

This question assessed the candidates' ability to recall and use the formula to find the area of a triangle. The number and percentage of candidates who chose the options are shown in Table 23.

Table 23: Number and Percentage of Candidates in each Option

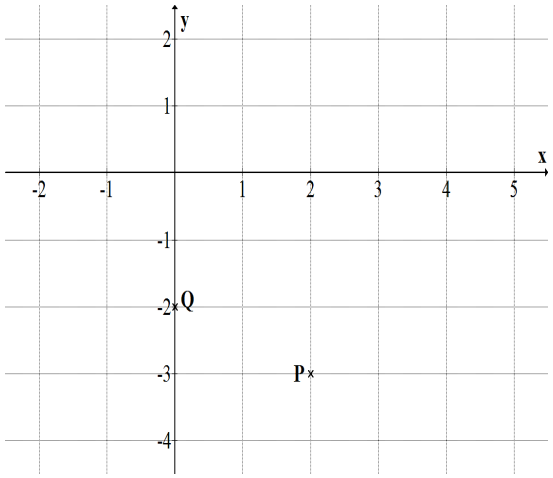
Option	A	B*	C	D	E	Others
Number of Candidates	201,622	496,785	106,795	59,722	63,818	9,241
Percentage of Candidates	21.5	53.0	11.4	6.4	6.8	1.0

Table 23 shows that, the performance in this question was average since 496,785 (53.0%) candidates used correctly the formula for finding the area of a triangle as follows;

Area of a triangle $= \frac{1}{2} \times \text{height} \times \text{length} = \frac{1}{2} \times 5cm \times 16cm = 40cm^2$. Hence they chose the correct answer B.

However, further analysis shows that, a total of 431,957 (46.1%) candidates lacked knowledge and skills to use the formula for finding the area of the triangle and chose distractor A, C, D or E. For example, the candidates who chose distractor A, simply multiplied the given dimensions of the triangle, that is, $5cm \times 16cm = 80cm^2$ and those who chose C added the dimensions of the triangle, that is; $5cm + 16cm = 21cm^2$.

Question 24: Write the coordinates of the points P and Q.



A P (2, -3) Q (2, 0) B P (-3, 2) Q (0, -2) C P (2, 3) Q (-2, 0)
D P (2, -3) Q (0, -2) E P (0, -2) Q (2, -3).

This question tested the candidates' ability to read the coordinates of points. The number and percentage of candidates who chose the options are shown in Table 24.

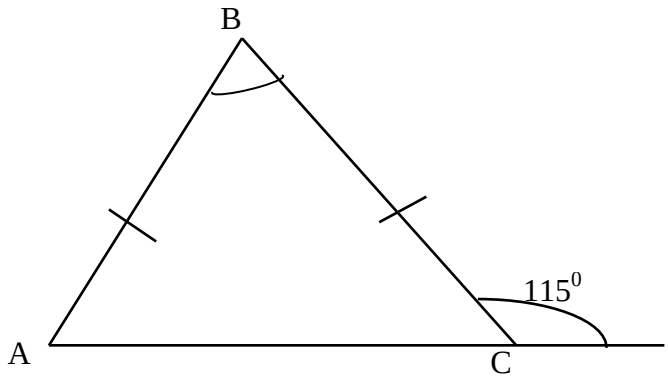
Table 24: Number and Percentage of Candidates in each Option

Option	A	B	C	D*	E	Others
Number of Candidates	125,200	210,244	83,185	455,647	55,033	8,674
Percentage of Candidates	13.3	22.4	8.9	48.6	5.9	0.9

The analysis of data shows that, the performance in this question was average, since 455,647 (48.6%) candidates were able to read correctly the coordinates of points P and Q. Thus, they chose D which was the correct answer .

However, 473,662 (50.5%) candidates chose distractor A, B, C or E. These candidates lacked knowledge on how to read the coordinates of a point $P(x, y)$. For instance, the candidates who chose distractor B, read the coordinate of y first instead of x for the point P.

Question 25: Find the size of angle ABC in the following figure:



A 50^o B 60^o C 65^o D 70^o E 90^o.

This question assessed the candidates' ability to find the size of angle ABC in the given figure. The number and percentage of candidates who chose the options are shown in Table 25.

Table 25: Number and Percentage of Candidates in Each Option

Option	A*	B	C	D	E	Others
Number of Candidates	287,587	116,083	379,385	58,437	86,636	9,855
Percentage of Candidates	30.7	12.4	40.4	6.2	9.2	1.1

The analysis of data shows that, the candidates' performance in this question was weak as only 287,587 (30.7%) candidates were able to answer this question and chose the correct answer A.

On the other hand, a total of 640,541 (68.2%) candidates did not answer correctly the question, hence chose the incorrect response B, C, D or E.

Further analysis shows that, most of the candidates were not able to find the size of angle ABC because they failed to use the properties of an isosceles triangle. For instance, those who chose distractor C, found the size of the angle ACB instead of angle ABC. Figure 7 shows the percentage of candidates for each option.

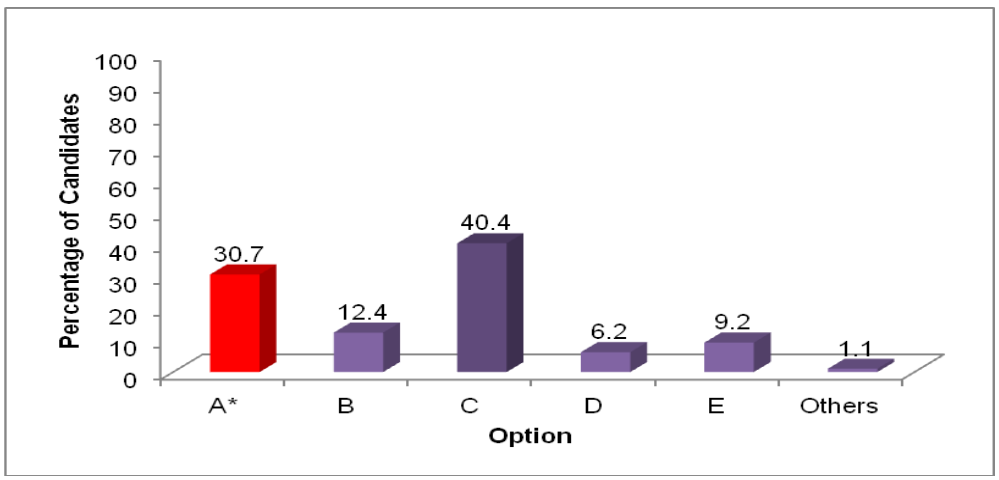
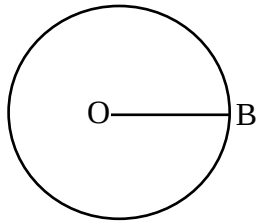


***Figure 7**: Candidates' Performance in Question 25.*

Question 26: The circumference of the following circle is 352 cm. Find its radius. $\left(\text{Use } \pi = \frac{22}{7}\right)$.



A 28 cm B 44 cm C 56 cm D 88 cm E 176 cm.

This question tested the candidates' ability to find the radius of a circle with a given circumference of 352cm and $\pi = \frac{22}{7}$. The number and percentage of candidates who chose the options are presented in Table 26.

Table 26 : Number and Percentage of Candidates in Each Option

Option	A	B	C*	D	E	Others
Number of Candidates	131,553	169,071	375,211	101,039	147,364	13,745
Percentage of Candidates	14	18	40	10.8	15.7	1.5

The analysis of data shows that, the performance of this question was average as 375,211 (40%) candidates answered it correctly and chose the correct answer C. The correct answer was obtained through the following calculations;

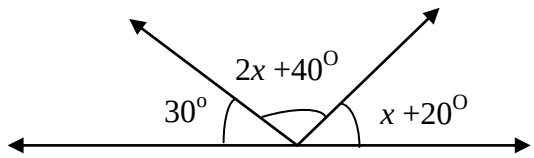
$\text{Circumference} = 2\pi r,$ where r is the radius of the circle.

$$\text{Thus, } 352 = 2\pi r \Rightarrow r = \frac{352\,\text{cm}}{2\pi} = \frac{352\,\text{cm} \times 7}{22 \times 2} = 56\,\text{cm}.$$

However, further analysis shows that, a total of 549,027 (58.5%) candidates could not use the given circumference to find the radius

and thus chose the incorrect response A, B, D or E. These candidates were not familiar with the formula for circumference of a circle. For instance, those who chose distractor A, did the calculations using an incorrect formula, that is; $\text{circumference} = 4\pi r \Rightarrow r = \frac{352 \times 7}{4 \times 22} = 28\,\text{cm}$, while those who chose E used another incorrect formula, that is, $c = 2r \Rightarrow r = \frac{352}{2} = 176\,\text{cm}$.

Question 27: Find the value of x in the following figure:



A 90^o B 60^0 C 45^o D 40^o E 30^o

This question tested the candidates' ability to find the value of x using the angles in the given figure. The number and percentage of candidates who chose the options are presented in Table 27.

Table 27: Number and Percentage of Candidates in Each Option

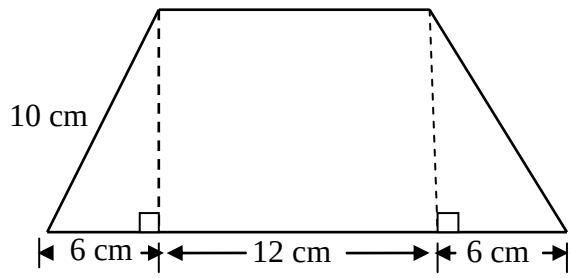
Option	A	B	C	D	E*	Others
Number of Candidates	165,641	78,498	87,213	44,884	552,432	9,315
Percentage of Candidates	17.7	8.4	9.3	4.8	58.9	1.0

The analysis of data shows that, the candidates' performance in this question was average as 552,432 (58.9%) candidates answered it correctly and chose the correct option E. These candidates had appropriate knowledge on the sum of degrees of all angles forming a

straight line. That is, $30^o + 2x + 40^o + x + 20^o = 180^o \Rightarrow 3x = 90^o$. $\therefore x = 30^o$.

However, further analysis shows that 376,236 (40.2%) candidates could not answer this question correctly due to lack of knowledge of angles in a straight line. For example, the candidates who opted for the distractor A considered that the sum of all angles in a straight line is equal to 360°, that is; $30^\circ + 2x + 40^\circ + x + 20^\circ = 360^\circ$, hence obtained $x = 90^\circ$. Likewise, those who chose distractor B, C or D failed to construct a suitable equation from the given figure.

Question 28: Find the area of the following figure:



A 144 cm^2 B 124 cm^2 C 120 cm^2 D 64 cm^2 E 36 cm^2.

The question tested the candidates' ability to find the area of trapezium. The number and percentage of candidates who chose the options are shown in Table 28.

Table 28: Number and Percentage of Candidates in Each Option

Option	A*	B	C	D	E	Others
Number of Candidates	403,116	168,748	202,366	31,116	123,959	8,678
Percentage of Candidates	43.0	18.0	21.6	3.3	13.2	0.9

The analysis shows that, this question had an average performance because 403,116 (43.0%) candidates were able to find the area of the trapezium and choose the correct answer A. The answer was obtained by applying the Pythagoras theorem to get the height of the trapezium, then using the formula to find the area of the trapezium. That is ,

$d^2 + h^2 = c^2$ where $d = 6cm$ and $c = 10cm$

$\Rightarrow h^2 = 10^2 - 6^2 = 100 - 36 = 64$

$\Rightarrow h = \sqrt{64}$

$\Rightarrow h = 8cm$

Area of trapezium = $\frac{1}{2}h(a+b) = \frac{1}{2} \times 8(12+24) = 144.$

On the other hand, a total of 526,189 (56.1%) candidates failed to answer this question correctly, as a result they chose distractor B, C, D or E. For example, the candidates who chose distractor C multiplied $10cm \times 12cm = 120cm^2$. This means that, the candidates lacked knowledge on the formula required to find the area of a trapezium. Figure 8 shows the percentage of candidates and their responses in each option.

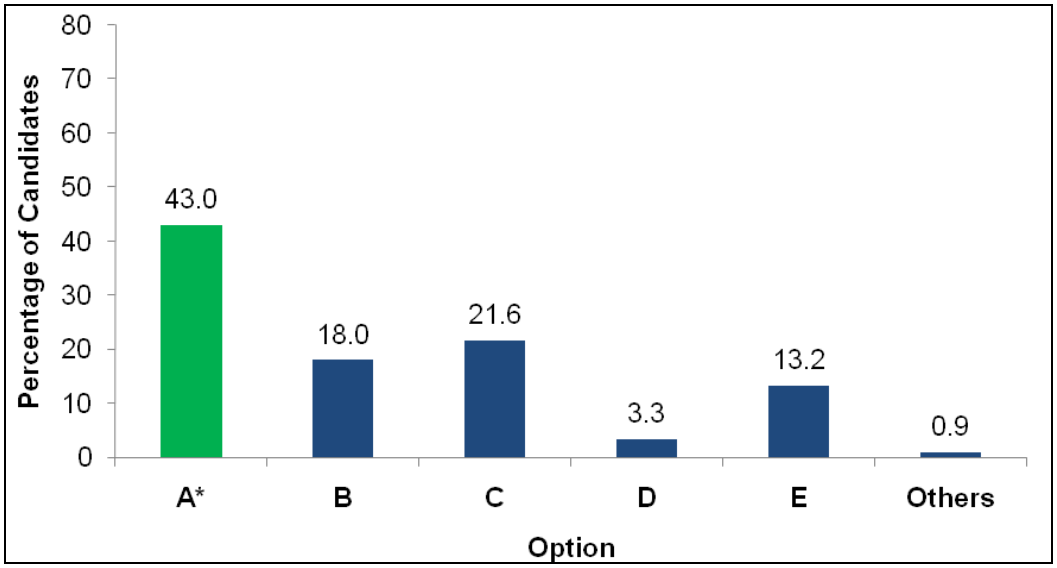
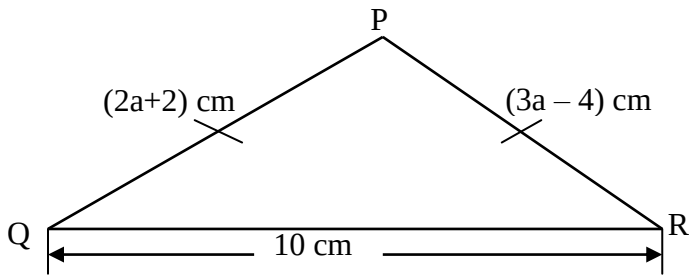


Figure 8: *Candidates' Performance in Question 28*

Question 29: Find the perimeter of the isosceles triangle PQR.



A 10 cm B 38 cm C 18 cm D 24 cm E 14 cm.

This question tested candidates' ability to find the perimeter of the isosceles triangle. The number and percentage of candidates who chose the options are shown in Table 29.

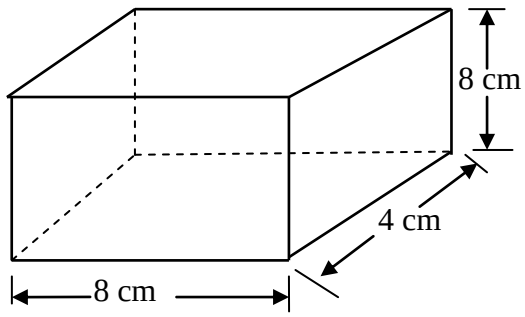
Table 29: Number and Percentage of Candidates in Each Option

Option	A	B*	C	D	E	Others
Number of Candidates	110,677	377,628	139,209	176,369	119,356	14,744
Percentage of Candidates	11.8	40.3	14.8	18.8	12.7	1.6

The analysis of data shows that, the candidates' performance in this question was average. A total of 377,628 (40.3%) candidates chose the correct answer B. These candidates were able to formulate the equation $2a+2=3a-4$ by considering the properties of an isosceles triangle and find the value of a. That is, $2+4=3a-2a \Rightarrow a=6$. Hence, the perimeter of the triangle was obtained by summing the lengths of its sides; $\overline{PQ}+\overline{PR}+\overline{QR}=14cm+14cm+10cm=38cm$.

However, further analysis shows that, 545,611 (58.2%) candidates chose distractor A, C, D or E. This shows that, these candidates lacked the knowledge of the properties of an isosceles triangle which was important concept in this question. For instance, the candidates who chose distractor A, considered the length $\overline{QR}$ = *10cm* which was given in the question as the perimeter of the triangle.

Question 30: Find the volume of the following figure:



A 192 cm^3 B 224 cm^3 C 128 cm^3 D 256 cm^3 E 64 cm^3.

This question tested candidates' ability to find the volume of the rectangular prism (cuboid). The number and percentage of candidates who chose the options are shown in Table 30.

Table 30: Number and Percentage of Candidates in Each Option

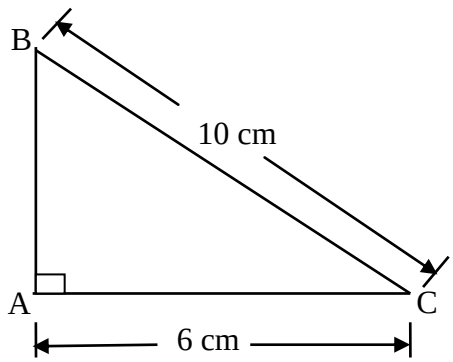
Option	A	B	C	D*	E	Others
Number of Candidates	71,200	104,943	103,997	559,117	88,198	10,528
Percentage of Candidates	7.6	11.2	11.1	59.6	9.4	1.1

The analysis of data shows that, the candidates' performance in this question was average. A total of 559,117 (59.6%) candidates chose the correct answer D. They applied correctly the formula for volume of a cuboid, that is; Volume of Cuboid= length × width × height

$$=8\text{cm}\times 4\text{cm}\times 8\text{cm}$$
$$=256\text{cm}^3.$$

However, a total of 368,338 (39.4%) candidates chose distractor A, B, C or E. These candidates were not able to apply the formula for finding the volume of a cuboid. For example, the candidates who chose distractor C, applied a wrong formula to calculate the volume as follows; $\text{Volume}=\frac{1}{2}(l\times w\times h)=\frac{1}{2}(8cm\times 4cm\times 8cm)=\frac{256cm^3}{2}=128cm^3$.

Question 31: Find the area of the following figure:



A 30 cm^2 B 24 cm^2 C 40 cm^2 D 48 cm^2 E 60 cm^2.

The question tested candidates' ability to calculate the area of a right angled triangle. The number and percentage of candidates who chose the options are shown in Table 31.

Table 31: Number and Percentage of Candidates in Each Option

Option	A	B*	C	D	E	Others
Number of Candidates	166,261	393,437	62,278	67,530	238,100	10,377
Percentage of Candidates	17.7	41.9	6.6	7.2	25.4	1.1

The analysis of data shows that, the performance in this question was average. A total of 393,437 (41.9%) candidates managed to find the area of the given figure and chose the correct answer B. These candidates had knowledge and skills on the application of the Pythagoras theorem. The correct answer was obtained through the following calculations;

$\overline{BC}^2 = \overline{AB}^2 + \overline{AC}^2 \Rightarrow \overline{AB}^2 + 6^2 = 10^2$

$\overline{AB}^2 = 100 - 36 \Rightarrow \overline{AB} = \sqrt{64}$

$\overline{AB} = height = 8cm$

$Area = \frac{1}{2} \times base \times height$

$= \frac{1}{2} \times 6cm \times 8cm = 3cm \times 8cm = 24cm^2.$

However, further analysis shows that, 534,169 (56.9%) candidates lacked knowledge and skills on the application of Pythagoras theorem. So, they could not obtain the correct answer. For instance, the candidates who chose distractor E multiplied 6 by 10 to get 60cm^2 and those who chose A, multplied $\frac{1}{2} \times 6 \times 10 = 30cm^2$.

Question 32: Joni bought 225 mangoes from a farmer. He sold 135 mangoes in a day. What percentage of mangoes was sold?

A 20 % B 30% C 40 % D 51 % E 60 %.

This question tested candidates' ability to solve a word problem related to the concepts of percentages. The number and percentage of candidates who chose the options are shown in Table 32.

Table 32: Number and Percentage of Candidates in each Option

Option	**A**	**B**	**C**	**D**	**E***	**Others**
Number of Candidates	122,348	160,684	181,518	78,760	380,597	14,076
Percentage of Candidates	13.0	17.1	19.4	8.4	40.6	1.5

The analysis shows that, the performance in this question was average since 380,597 (40.6%) candidates chose the correct answer E. These candidates were able to write the given information into mathematical statements as follow;

Step 1: Mangoes bought = 225

Step 2: Mangoes sold = 135

Therefore, the percentage of mangoes sold = $\frac{\text{Mangoes Sold}}{\text{Mangoes Bought}} \times 100\%$

$$= \frac{135}{225} \times 100\% = 60\%.$$

However, the analysis also shows that, 543,310 (57.9%) candidates failed to answer this question correctly. They opted for the distractor A, B, C or D, due to lack of knowledge and skills to convert the given information into mathematical statements. For example, the candidates who chose distractor C, used wrong method that led to

incorrect answer as they subtracted the numbers; $225 - 135 = 90 \Rightarrow \frac{90}{225} \times 100\% = 40\%$.

Question 33: The sum of the lengths of parallel sides of trapezium is 24 cm. If the height of the trapezium is 7 cm, find the area of the trapezium.

A 72 cm^2 B 74 cm^2 C 82 cm^2 D 84 cm^2 E 158 cm^2.

The question tested the candidates' ability to apply an appropriate formula in order to calculate the area of the trapezium. The number and percentage of candidates who chose the options are shown in Table 33.

Table 33: Number and Percentage of Candidates in Each Option

Option	**A**	**B**	**C**	**D***	**E**	**Others**
Number of Candidates	96,815	102,897	91,622	369,520	262,915	14,214
Percentage of Candidates	10.3	11.0	9.8	39.4	28.0	1.5

The analysis of data shows that, the candidates' performance in this question was weak. A total of 554,249 (59.1%) candidates chose the distractor A, B, C or E. These candidates lacked knowledge and skills to properly apply the formula to calculate the area of trapezium. For example, the candidates who chose E multiplied $24cm$ by $7cm$ and got $158cm^2$, but did not proceed to the final step of dividing $158cm^2$ by 2 to get the required answer.

However, further analysis shows that, 369,520 (39.4%) candidates who chose the correct answer D were able to correctly apply the formula to calculate the area of the trapezium as follows;

The sum of the lengths of parallel sides of the trapezium

$$= length_1 + length_2 = 24cm$$

Area of trapezium $= \frac{1}{2} \times height \times (length_1 + length_2)$

$$= \frac{1}{2} \times 7cm \times 24cm = 7cm \times 12cm = 84cm^2$$

Question 34: Martha walks from home to the shop at a speed of 2 kilometers per hour. If she takes half an hour, what is the distance from her home to the shop?

A 1 km B 2 km C 3 km D 4 km E 5 km.

This question tested the candidates' ability to solve word problems related to speed. The number and percentage of candidates who chose the options are shown in Table 34.

Table 34: Number and Percentage of Candidates in Each Option

Option	A*	B	C	D	E	Others
Number of Candidates	355,802	173,446	123,487	159,049	113,085	13,114
Percentage of Candidates	37.9	18.5	13.2	17.0	12.1	1.4

The analysis of data shows that, the candidates' performance in this question was weak. A total of 569,067 (60.7%) candidates chose distractor B, C, D or E. These candidates were not able to find the required distance using the given speed and time. For example, the candidates who chose distractor B considered the speed of 2 km per hour as the required distance.

On the other hand, 355,802 (37.93%) candidates were able to choose the correct answer A. This indicates that, they related speed, distance and time correctly as follows:

Distance = speed x time

$$= 2\frac{km}{hr} \times \frac{1}{2} hr = 1km$$

Therefore, the distance was 1 km. Figure 9 shows the percentage of candidates' responses in each option.

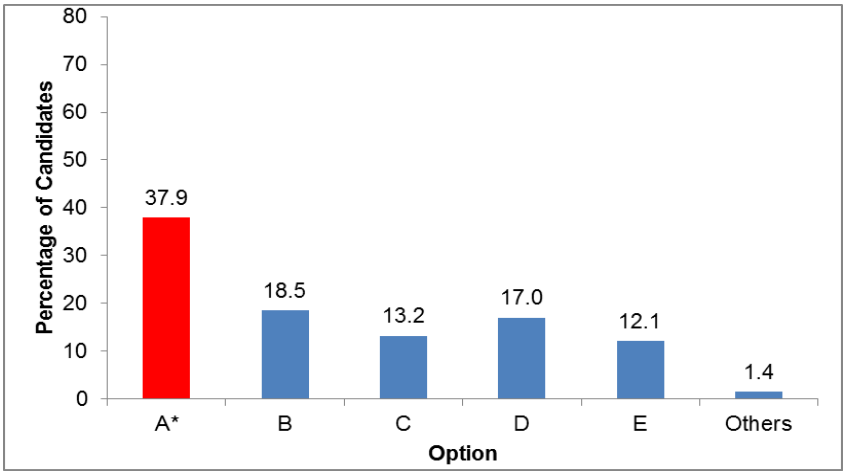


Figure 9: *candidates' performance in question 34*

Question 35. Four villages in one of the region harvested 60,000 kilogram of cashew nuts. What was the average harvest in tons of each village? (1 Ton = 1000 kg).

A 5 tons B 10 tons C 15 tons D 20 tons E 25 tons.

This question tested the candidates' ability to convert units of mass in kilogram into tons. The number and percentage of candidates who chose the options are shown in Table 35.

Table 35: Number and Percentage of Candidates in Each Option

Option	**A**	**B**	**C***	**D**	**E**	**Others**
Number of Candidates	113,348	144,678	450,532	99,705	116,919	12,801
percentage of Candidates	12.1	15.4	48.0	10.6	12.5	1.4

The analysis of data shows that, the candidates' performance in this question was average as 450,532 (48.0%) candidates chose the correct answer C. These candidates obtained the average harvest in each village as follows;

$4 \text{ villages} \rightarrow 60{,}000\text{kg}$

$1 \text{ village} \rightarrow ?\,\text{kg}$

$\frac{60{,}000\text{kg}}{4} = 15{,}000\text{kg}$

Thus, 1 village harvested 15,000kg.

Then, they converted the result from kilograms into tons as follows;

$1 \text{ ton} \rightarrow 1000\text{kg}$

$?\text{tons} \rightarrow 15{,}000\text{kg}$

$\frac{1\text{ton} \times 15{,}000kg}{1000kg} = 15 \text{ tons}$

However, the analysis also indicates that, 474,650 (50.6%) candidates lacked knowledge on averages and conversion of units of mass, hence chose distractor A, B, D or E. These candidates could not find the average harvest of each village in kilograms or in tons. For instance, the candidates who chose distractor B considered the relation between kilograms and tons as $1 \text{ ton} = 1500kg$ contrary to the given instructions.

Question 36: A farmer sold cotton and got shs 2,500,000. If the price of one kilogram was shs. 2,500, how many kilograms did he sell?

A 25 B 50 C 500 D 1,000 E 1,500.

This question tested the candidates' ability to divide whole numbers from a word problem. The number and percentage of candidates with their responses are shown in Table 36.

Table 36: Number and Percentage of Candidates in Each Option

Option	A	B	C	D*	E	Others
Number of Candidates	94,500	93,505	115,633	500,912	121,241	12,192
Percentage of Candidates	10.1	10.0	12.3	53.4	12.9	1.3

The analysis shows that, the performance in this question was average as 500,912 (53.4%) candidates chose the correct answer D. These candidates divided 2,500,000 by 2,500 and got 1,000 kilograms of cotton, which was the required answer.

However, the analysis also shows that, 424,879 (45.3%) candidates chose A, B, C or E which are incorrect options. The candidates chose incorrect answers due to failure to adhere to the instructions given in the question and inability to perform the division operation.

Question 37: The total age of the father and his child is 40 years. If the age of the father is three times the age of the child, what is the age of the child?

A 5 B 10 C 15 D 20 E 25.

This question tested the candidates' ability to formulate and solve equations in one unknown variable. The number and percentage of candidates with their responses are represented in Table 37.

Table 37: Number and Percentage of Candidates in Each Option

Option	A	B*	C	D	E	Others
Number of Candidates	88,491	496,475	146,756	124,242	69,825	12,194
Percentage of Candidates	9.4	52.9	15.6	13.2	7.4	1.3

The analysed data shows that, the performance in this question was average as 496,475 (52.9%) candidates managed to answer it

correctly by choosing the correct option B. This indicates that, the candidates had adequate knowledge and skills on formulating and solving equations in one unknown variable. They formulated the equation $3x + x = 40$, where x represents the age of the child and $3x$ the age of the father. Then, they solved for x as follows;

$$3x + x = 40 \Rightarrow 4x = 40 \Rightarrow x = \frac{40}{4} = 10$$

On the other hand, 429,314 (45.6%) candidates failed to answer this question and ended up choosing the incorrect option A, C, D or E. This indicates lack of knowledge and skills on how to formulate and solve equations. For example, those who chose distractor D considered the age of the father as being equal to the age of the child.

Question 38: The number of pupils in grade 5B at Mwembeni primary school who passed the Mathematics weekly test in four weeks is as shown in the following table:

Week	I	II	III	IV
Number of Pupils	76	64	...	72

If the average number of pupils who passed is 70, how many pupils passed in the third week?

A 64 B 66 C 68 D 70 E 72.

This question tested the ability of the candidates to solve a word problem related to the concept of average. Table 38 shows the number and percentage of candidates with their responses for each option.

Table 38: Number and Percentage of Candidates in Each Option

Option	A	B	C*	D	E	Others
Number of Candidates	80,499	157,890	435,171	150,093	99,916	14,414
Percentage of Candidates	8.6	16.8	46.4	16.0	10.7	1.5

The analysis shows that, the performance in this question was average since 435,171 (46.4%) candidates were able to find the missing number using the given data and chose the correct option C. This means that these candidates had adequate knowledge and skills on the concept of average. The number of pupils (x) who passed in the third week was obtained as follows;

$$\frac{76+64+x+72}{4}=70 \quad \Rightarrow \frac{212+x}{4}=70 \quad \Rightarrow 212+x=280 \quad \Rightarrow x=280-212;$$

$$\therefore x=68$$

The analysis also shows that, 488,398 (52.1%) candidates could not find the number of pupils who passed in the third week. So, they ended up choosing the incorrect option A, B, D or E. This was the result of lack of knowledge and skills on the concept of average. For example, 150,093 (16.0%) candidates considered the average number of pupils (70) given in the question to be equal to the number of pupils passed in the third week. Therefore, they chose the incorrect option D.

Question 39: Mapinduzi primary school has a total of 860 pupils. If the number of boys is 432, how many girls are there?

A 328 B 418 C 432 D 438 E 428.

This question tested the candidates' ability to solve a word problem. Table 39 shows the number and percentage of candidates with their responses in each option.

Table 39: Number and Percentage of Candidates in Each Option

Option	A	B	C	D	E*	Others
Number of Candidates	65,253	63,359	98,686	63,198	637,026	10,461
Percentage of Candidates	7.0	6.8	10.5	6.7	67.9	1.1

Data analysis shows that, the performance in this question was good as 637,026 (67.9%) candidates chose the correct answer E. This performance was due to the ability of these candidates to formulate the equation; $432+x=860$, where x is the number of girls. They correctly solved it to get $x=428$.

Despite the good performance in this question, further analysis shows that, 290,496 (31%) candidates failed to answer this question correctly. Therefore, they chose the option A, B, C or D. For example, 98,686 (10.5%) candidates considered the given number of boys to be equal to the number of girls. This attracted them to choose distractor C. These candidates did not understand the requirements of the question. However, those who chose distractor B or D failed to perform subtraction by borrowing, hence they were unable to get the correct answer.

Question 40: Three pupils sit on one desk in a grade six classroom. If the classroom has 60 pupils, how many desks are there?

A 20 B 30 C 40 D 50 E 60.

This question tested the candidates' ability to solve a word problem related to division of whole numbers. The number and percentage of candidates with their responses in each option are shown in Table 40.

Table 40: Number and Percentage of Candidates in Each Option

Option	**A***	**B**	**C**	**D**	**E**	**Others**
Number of Candidates	621,905	133,473	51,150	45,142	77,152	9,161
Percentage of Candidates	66.3	14.2	5.5	4.8	8.2	1.0

The analysis shows that, the question had a good performance because 621,905 (66.3%) candidates chose the correct answer A as shown in Table 40. This performance was due to the ability of the candidates to solve mathematical problems. These candidates knew that, they were to divide the total number of pupils by 3 to get the required answer. That is, $\text{Number of desks} = \frac{60}{3} = 20$.

Inspite of this performance, the analysis also shows that, 306,917 (32.7%) candidates failed to answer this question correctly. These candidates chose distractor B, C, D or E due to lack of knowledge on the requirements of the question. For instance, those who chose distractor E thought that the number of pupils is equal to the number of desks in the classroom.

2. 2 Section B: Short Answer Items

Question 41: $\left(^{-}12 - ^{-}3\right) \times \left(^{+}6 - ^{-}3\right) =$

This question assessed the candidates' ability to use the BODMAS rule in evaluating the given expression. Figure 10 depicts the candidates' performance in this question.

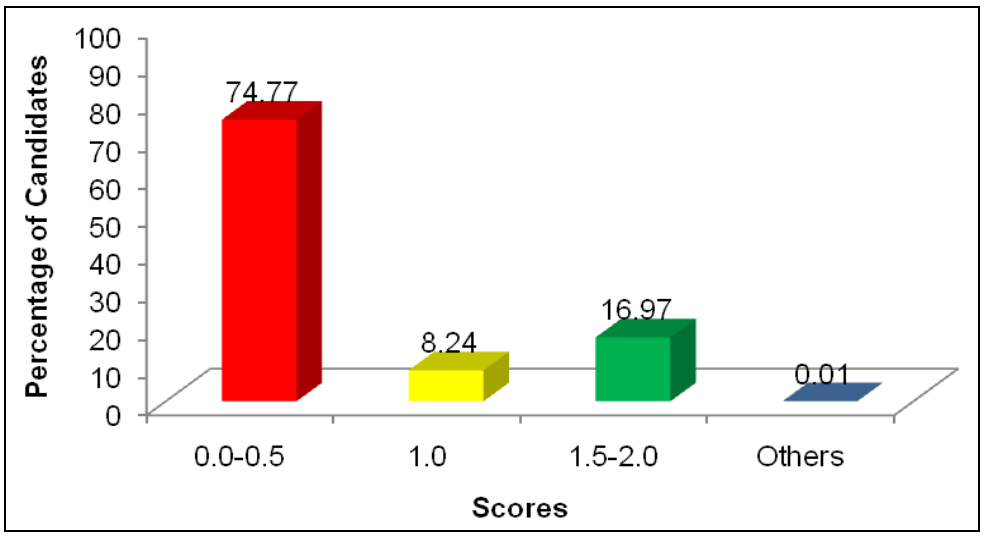


***Figure 10**: Candidates' performance in question 41*.

Figure 10 shows that, this question had a weak performance since only 25.2 percent of the candidates scored from 1 to 2 out of 2 marks. Further analysis also shows that, 74.77 percent of the candidates scored 0 mark. This indicates that most of the candidates lacked skills on how to use BODMAS rule to evaluate the given expression. Extract 41.1 shows a sample solution of a candidate who lacked knowledge on the use of BODMAS rule.

Extract 41.1

41.	$(^{-}12 - ^{-}3) \times (^{+}6 - ^{-}3) =$	$(-12 - ^{-}3) \times (^{+}6 - ^{-}3)$ $= ^{+}10 \times ^{-}3$ $= ^{+}30$	$^{+}30$

Extract 41.1: A sample solution of a candidate who failed to correctly evaluate the given expression by using the BODMAS rule.

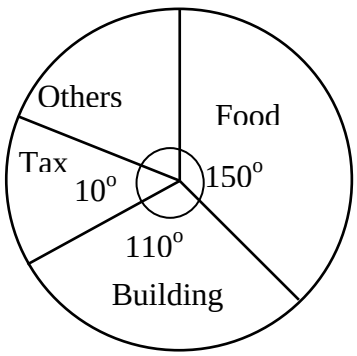
Despite the weak performance, further analysis shows that, 17.0 percent of the candidates scored all 2 marks in this question. These candidates were able to use correctly the BODMAS rule in finding the value of the given expression. A sample solution of a candidate who used the BODMAS rule correctly to evaluate the given expression is shown in Extract 41.2.

Extract 41.2

41.	$(^{-}12 - ^{-}3) \times (^{+}6 - ^{-}3) =$	$(-12+3) \times (6+3)$ -9×9 $= -81$	-81

Extract 41.2: A sample solution of a candidate who was able to correctly evaluate the given expression by using the BODMAS rule.

Question 42: Kidawa uses a salary as shown in the following pie chart. If her salary is shs. 720,000, how much is saved for other uses?



This question tested the candidates' ability to use a pie chart to solve a mathematical problem about expenditures. Figure 11 summarizes the performance of candidates in this question.

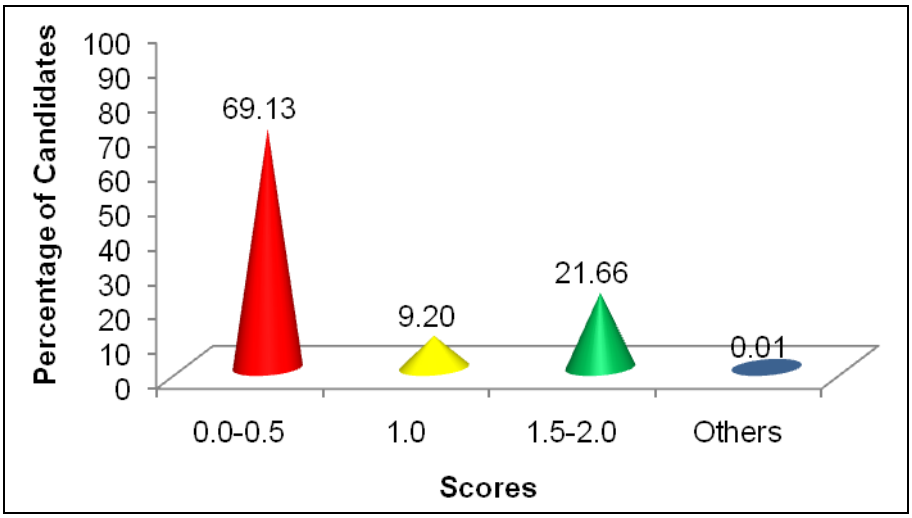


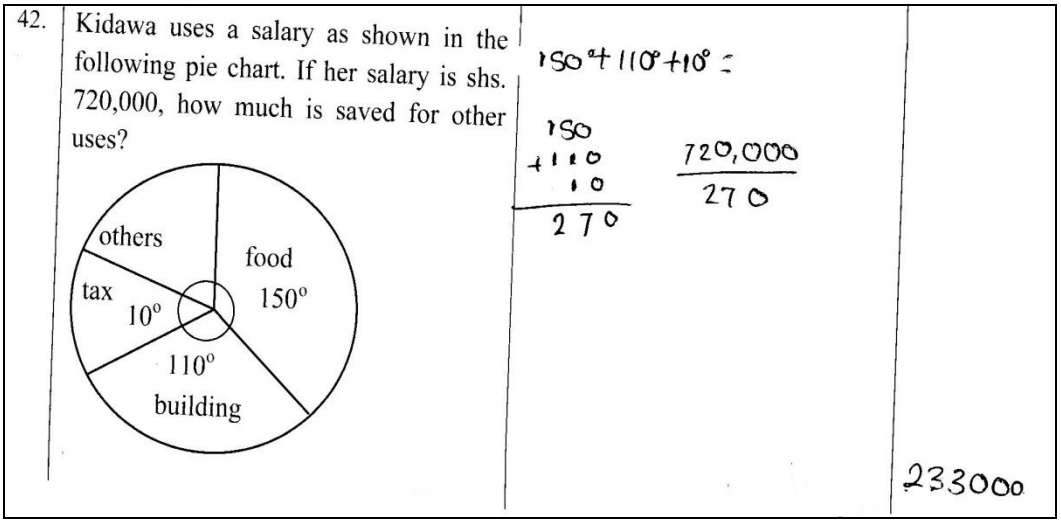
Figure 11: *Candidates' performance in question 42*.

Figure 11 shows that, 30.9 percent of the candidates scored marks from 1 to 2. This means that, the question was averagely performed. The analysis also shows that, 69.1 percent of the candidates scored either 0 or 0.5 out of 2 marks.

However, further analysis shows that, 492,765 (52.5%) candidates scored 0 mark. These candidates lacked adequate knowledge on how to use a pie chart in finding the angle representing the amount of salary saved for "other uses". They did not know that the angle representing "other uses" was $360^0 - (10^0 + 110^0 + 150^0) = 90^0$; so the corresponding amount of salary was supposed to be $\frac{90^0}{360^0} \times 720,000 = shs.\ 180,000$. Also, some candidates added 10^0, 110^0, 150^0 and got 270^0 but failed to do neccessary calculations to get the amount saved for other uses. Extract 42.1 is a sample

solution of a candidates who lacked knowledge on the use of the given pie chart.

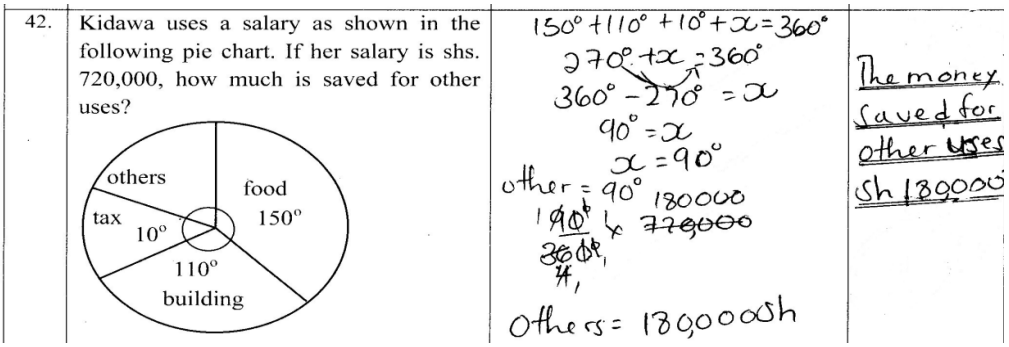
Extract 42.1



Extract 42.1 shows a sample solution of a candidate who failed to find the angle representing "other uses" that could be obtained by writing $360^0 - 270^0 = 90^0$.

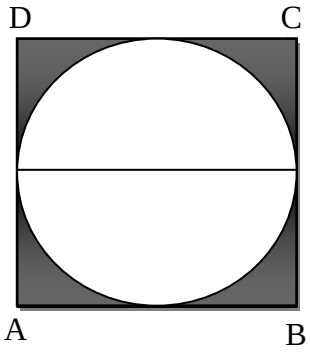
Further analysis shows that, 146,439 (15.6%) candidates answered this question correctly and scored all 2 marks. It is clear that, these candidates had good understanding of the use of pie chart in finding the unknown angle, which was important in finding the amount of salary saved for "other uses". Extract 42.2 is a sample solution of a candidate who used the pie chart correctly to obtain the required answer.

Extract 42.2



Extract 42.2 illustrating the work of a candidate who answered this question correctly.

Question 43: Figure ABCD is a square with a circle whose diameter is 42 cm. Find the area of the shaded part. $\left(\text{Use } \pi = \frac{22}{7}\right)$.



This question tested the candidates' ability to find the area of the shaded region in the given figure. Figure 12 shows the candidates' performance in this question.

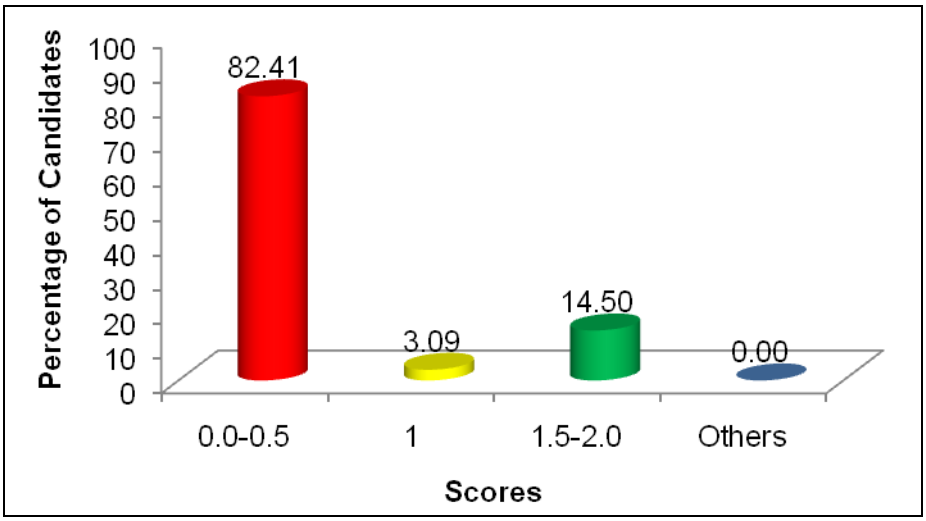
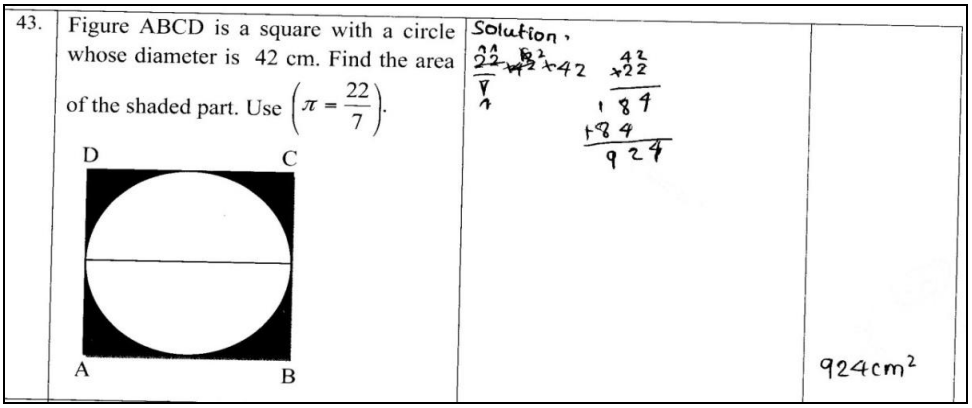


***Figure 12**: Candidates' performance in question 43.*

Figure 12 shows that, 17.6 percent of the candidates scored pass marks ranging from 1 to 2 out of 2 marks. This is clearly a weak performance. The question had the worst performance of all questions in Section B as analysis shows that 82.41 percent of the candidates scored 0 or 0.5 out of 2 marks.

However, further analysis shows that, 658,522 (70.2%) candidates scored 0 mark. These candidates were not able to answer this question correctly because they failed to use the correct formula for finding the area of a square and the area of a circle. For example, some candidates used the wrong formulae for area of a circle like $A = \frac{\pi d}{2} + d$, instead of the correct formula $A = \frac{\pi d^2}{4}$ or $A = \pi r^2$. Other candidates were able to write the correct formulae but failed to apply them. For example, instead of writing; $\text{Area of square} = 42 \times 42 = 1764$ they wrote $\text{Area of square} = 42 \times 4 = 168$ which is perimeter of the square given in figure ABCD. Extract 43.1 is a sample solution of a candidate who failed to obtain the correct answer.

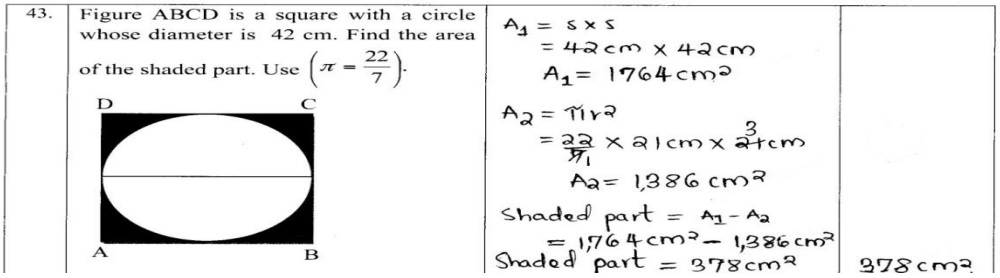
Extract 43.1



Extract 43.1: shows the solution of a candidate who calculated the area of the circle as $\left(\frac{22}{7} \times 42 \times 42\right)$, instead of $\left(\frac{22}{7} \times \frac{42 \times 42}{4}\right)$ which was one of the steps in finding the area of shaded region.

Although the performance in this question was weak, the analysis shows that, 119,936 (12.8%) candidates scored all 2 marks in this question. This implies that these candidates had adequate knowledge on how to find the area of the shaded part. They were able to find the area of the square and the area of the circle and eventually computed the difference in order to get the area of the shaded region. Extract 43.2 is a sample solution of a candidate who calculated the shaded area correctly.

Extract 43.2



In **Extract 43.2**, the candidate calculated the shaded area correctly.

Question 44: Kamota bought 74.6 kilograms of wheat flour in a first day. In a second day he bought 9.53 kilograms. How many kilograms did he buy in two days?

This question assessed the candidates' ability to solve a mathematical word problem that involved addition of metric units of mass. The candidates' performance in this question is shown in Figure 13.

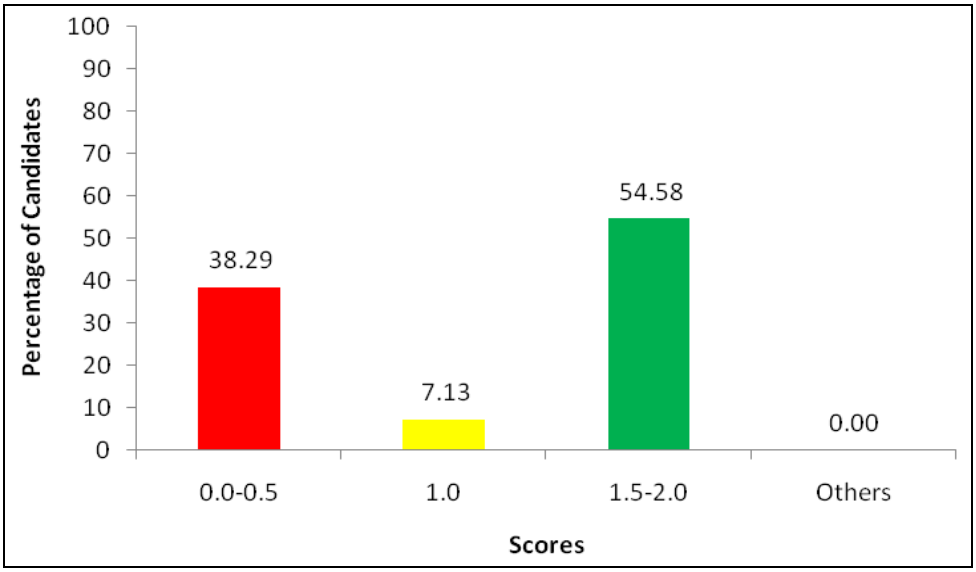
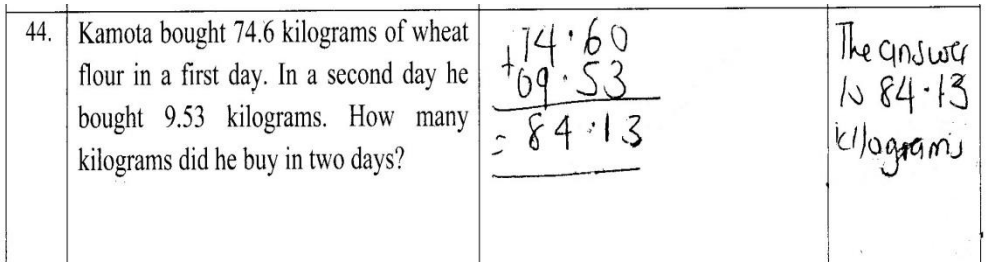


Figure 13: *Candidates' performance in question 44*.

Figure 13 shows that, 61.71 percent of the candidates scored pass marks ranging from 1 to 2 out of 2 marks, which is a good performance. It also shows that, 54.58 percent scored 1.5 or 2, while 54.52 percent of them scored all 2 marks. These candidates had knowledge and skills on the concept of adding decimals and got the total number of kilograms bought in two days. Extract 44.1 shows a sample solution of a candidate who was able to answer this question correctly.

Extract 44.1



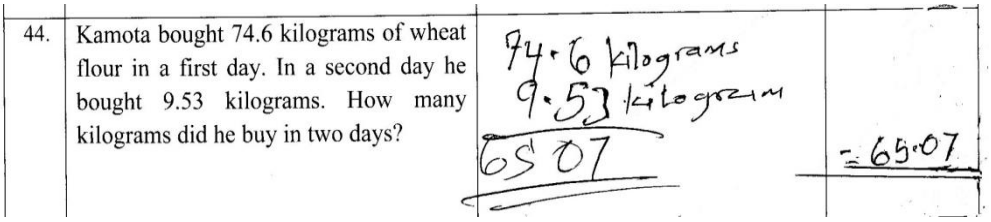
Extract 44.1: A sample solution of a candidate who correctly added the given metric units of mass.

On the other hand, the analysis shows that, 358,457 (38.2%) candidates failed to answer this question correctly and hence got 0 mark. These candidates lacked knowledge and skills on adding decimals involving different number of decimal places. Most of these candidates failed to arrange the numbers to ensure that the decimal points line up before proceeding with usual addition. For example, some of them wrote;

$$\begin{array}{r} 7.46 \\ +\ 9.53 \\ \hline 16.99 \\ \hline \end{array}$$

and ended up with incorrect answers. Other candidates performed meaningless calculations using the numbers that were given in the question. Extract 44.2 shows a sample solution of a candidates who failed to add the given metric units of mass.

Extract 44.2



Extract 44.2: A sample solution of a candidate with an incorrect answer.

Question 45: Mwanahawa bought the following items:

6 matresses @ shs. 80,000

10 chairs @ shs. 20,000 and

5 tables @ shs. 40,000.

If she had 1,000, 000 in her pocket, how much money remained?

This question assessed the candidates' ability to find the amount of money remained after the purchases shown in the price bill. Figure 14 summarizes the performance of the candidates in this question.

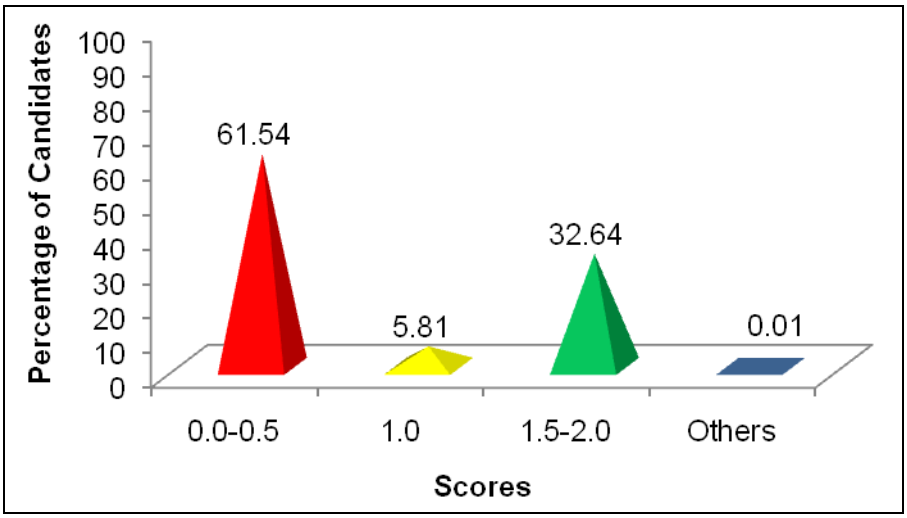


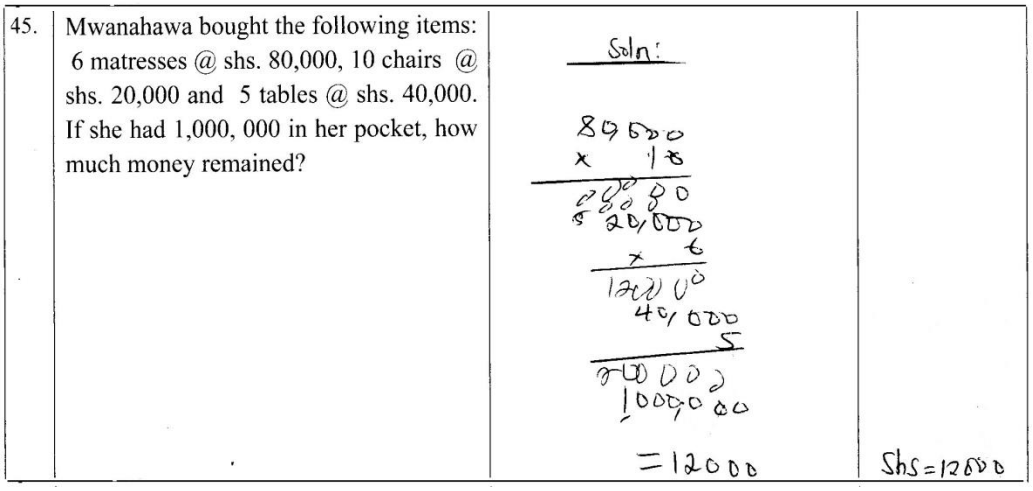
***Figure 14**: Candidates' performance in question 45*.

The analysis shows that, 38.5 percent of the candidates scored marks ranging from 1 to 2 out of 2 marks. So, the performance in this question was weak. The analysis also shows that, 61.5 percent of the candidates scored either 0 or 0.5 out of 2 marks allocated for this question.

Moreover, further analysis shows that, 511,660 (54.5%) candidates scored 0 mark. These candidates were not able to answer this question correctly. They lacked knowledge and skills in performing the

calculations involving the price bills. Most of these candidates did not know that the given prices were the costs per item. So, they were not able to calculate the total cost and the balance after expenditures. Extract 45.1 is a sample solution of a candidate who performed wrong calculations.

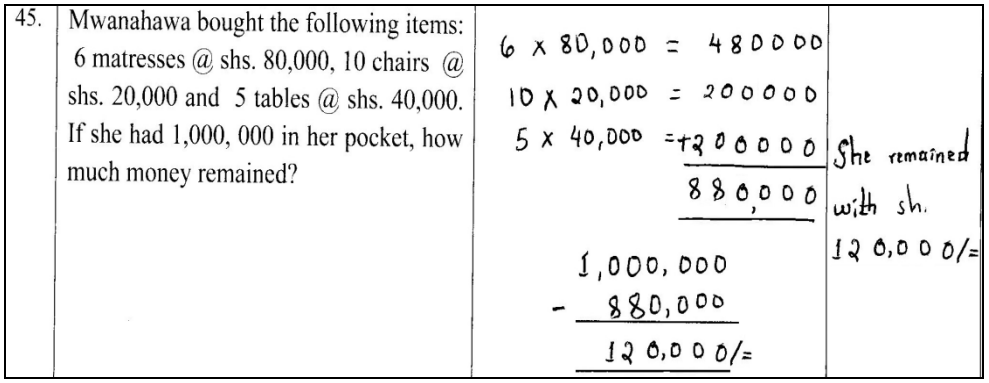
Extract 45.1



Extract 45.1: Shows a sample solution of a candidate who failed to solve a word problem related to price bill.

However, further analysis shows that, 274,756 (29.3%) candidates were able to answer this question correctly and score all 2 marks. These candidates had adequate knowledge and skills to correctly solve a mathematical word problem related to price bill. A sample solution of a candidate who had correct calculations is shown in Extract 45.2.

Extract 45.2



Extract 45.2: A sample solution of a candidate who managed to correctly calculate the amount of money remained after all the purchases.

3.0 A SUMMARY OF THE ANALYSIS OF CANDIDATES' RESPONSES

The analysis of the candidates' responses in the 2018 Mathematics examination shows that, out of 40 questions of Section A, 19 were well performed. These questions were from the topics on *Whole Numbers*, *Squares and Square Roots*, *Decimals*, *Fractions* and *Roman Numbers*.

Also in Section A, the analysis shows that 21 questions were averagely performed. The questions were set from the topics on *Coordinate Geometry, Units, Percentages, Statistics, Geometry*, *Algebra*, *Money* and *Integers*.

In Section B, only 01 question that was set from the topic on *Units* had a good performance. The remaining 04 questions had weak performance. These questions were from the topics on *Integers*, *Statistics*, *Geometry* and *Money*.

The analysis of the candidates' performance topic-wise is shown in Appendices I, II and III.

The weak performance was mainly contributed by the candidates' inability to: perform mathematical operations correctly, use the appropriate concepts and correct formulae, and solve equations and word problems correctly.

4.0 CONCLUSION

Generally, the performance in the Mathematics examination in 2018 was improved compared to that of 2017. The analysis showed that, out of 13 topics which were examined in 2018, 05 topics on *Whole Numbers*, *Squares and Square Roots*, *Decimals*, *Roman Numbers* and *Fractions* were well performed. There were 05 topics that a had good performance in 2017, which were *Whole Numbers*, *Squares and Square Roots*, *Decimals*, *Roman Numbers* and *Coordinate Geometry*. Therefore, in both 2017 and 2018 the number of topics with good performance remained the same although *Whole Numbers*, *Squares and Square Roots*, *Decimals* and *Roman Numbers* continued to have good performance in both years.

However, the analysis showed that, 07 topics had an average performance in 2018. These topics were *Coordinate Geometry, Units, Percentages, Statistics, Geometry*, *Algebra* and *Money*. Likewise, 07 topics had an average performance in 2017. Those topics were *Fractions*, *Percentages*, *Statistics*, *Integers*, *Geometry*, *Algebra* and *Money*.

On the other hand, there was only 01 topic with a poor performance in 2018 which was on *Integers*, while in 2017, the topic which was poorly performed was *Units*.

Further analysis shows that, some of the reasons that contributed to weak performance of the candidates include: lack of knowledge and

skills on performing mathematical operations correctly, using appropriate concepts and correct formulae and solving equations and word problems correctly.

5.0 RECOMMENDATIONS

In order to improve the performance of the candidates in future Primary School Leaving Examinations (PSLE) in Mathematics, the National Examinations Council of Tanzania recommends the following:

(a) Teachers should put more effort in teaching the topic on *Integers* that had weak performance. They should also put more emphasis on the topics on *Coordinate Geometry, Units, Percentages, Statistics, Geometry*, *Algebra* and *Money,* which had average performance.

(b) Teachers should provide adequate exercises, especially on the questions about figures and word problems in order to build pupils' ability in using various concepts and formulae in answering questions.

(c) Teachers should mark the pupils' assignments, provide feedback on time and device a mechanism to assist them depending on their learning abilities.

Appendix I

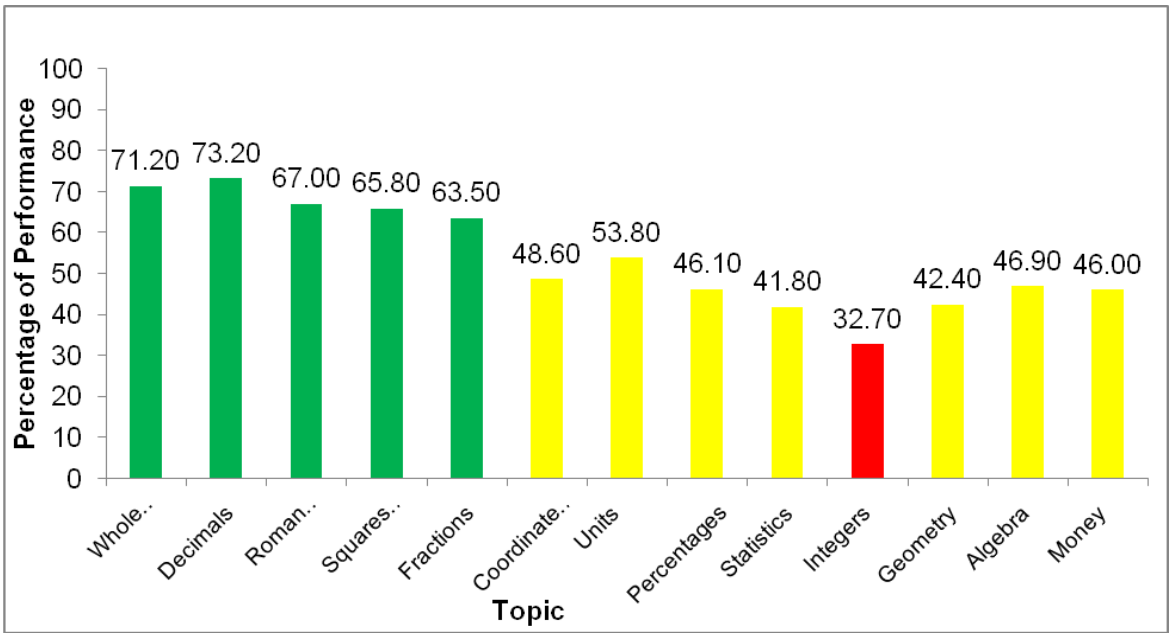
COMPARISON OF CANDIDATES' PERFORMANCE PER TOPIC BETWEEN PSLE 2017 AND PSLE 2018

No	Topic	2017				2018			
		Performance for each Question				Performance for each Question			
		Question Number	Performance (%)	Average Performance (%)	Remarks	Question Numberr	Performance (%)	Average Performance (%)	Remarks
1.	Whole Numbers	2	87	73.13	Good	1	67.5	71.2	Good
		3	87.2			3	88.4		
		4	87			5	82.7		
		10	64.3			7	71.3		
		16	61.4			14	63.2		
		23	51.9			16	71.8		
						18	61.9		
						39	67.9		
						40	66.3		
2.	Decimals	1	90	84.3	Good	10	68.4	73.2	Good
		11	78.6			19	78.0		
3.	Roman Numbers	21	69.1	69.1	Good	9	67.0	67.0	Good
4.	Squares and Square roots	15	59.7	59.7	Good	8	66.1	65.8	Good
						12	65.9		
						21	65.5		
5.	Fractions	5	59.4	48.44	Average	2	39.2	63.5	Good
		6	70.5			4	72.6		
		9	60.3			6	76.3		
		13	24.6			20	66.0		
		22	50.5						
		44	30.5						
		47	52.7						
		49	39						
6.	Coordinate Geometry	32	63.3	63.3	Good	24	48.6	48.6	Average
7.	Units	25	60.4	33.0	Weak	15	76.9	53.8	Average
		39	28.8			34	37.9		

No	Topic	2017				2018			
		Performance for each Question				Performance for each Question			
		Question Number	Performance (%)	Average Performance (%)	Remarks	Question Numberr	Performance (%)	Average Performance (%)	Remarks
		48	20.5			44	61.7		
		42	22.3						
8.	Percentage	17	67.3	52.77	Average	11	51.5	46.1	Average
		20	52.6			32	40.6		
		24	38.4						
9.	Statistics	35	52.4	44.13	Average	35	48.0	41.8	Average
		38	38.5			38	46.4		
		50	41.5			42	30.9		
10.	Integers	7	57	48.85	Average	13	40.2	32.7	Weak
		8	40.7			41	25.2		
11.	Geometry	26	40	43.44	Average	23	53.0	42.4	Average
		27	17.7			25	30.7		
		28	32.2			26	40.0		
		29	51			27	58.9		
		30	80.6			28	43.0		
		31	52.6			29	40.3		
		33	52.3			30	59.6		
		34	39.8			31	41.9		
		36	38.7			33	39.4		
		37	29.5			43	17.6		
12.	Algebra	12	34.2	42.5	Average	17	38.3	46.9	Average
		14	64.4			22	48.4		
		18	23.7			37	53.9		
		19	47.6						
13.	Money	40	43.8	40.3	Average	36	53.4	46.0	Average
		41	63.9			45	38.5		
		43	23.1						
		45	32.8						
		46	37.9						

Appendix II

PERCENTAGE OF PERFORMANCE FOR EACH TOPIC IN 2018



Appendix III

COMPARISON OF CANDIDATES' PERFORMANCE PER TOPIC BETWEEN PSLE 2017 AND PSLE 2018