5.0   MATHEMATICS

In the year 2012, **811680** candidates sat for the KCPE Mathematics examination. The candidates registered a mean score of **28.15** with a standard deviation of **10.51**. This was a significant improvement in performance when compared to the performance in the year 2011, which had a mean score of **26.16** with a standard deviation of **10.01**.

5.1   GENERAL PERFORMANCE

Table 9: General Performance in Mathematics for the last five years

Year	2008	2009	2010	2011	2012
National Mean	23.58	24.78	26.90	26.16	28.15
Standard Deviation	9.96	10.09	10.26	10.01	10.51

From *table 9* above, it can be observed that the performance in 2012 KCPE Mathematics improved remarkably compared to performance in the previous four years both in mean and standard deviation.

Table 10: General Performance in 2012 KCPE by Gender

Gender	Male	Female
Entry	415601	396079
National Raw Mean	29.24	27.01
Standard Deviation	10.77	10.09

From *table 10* above, it can be observed that:

(i)   Male candidates performed better with a mean sore of 29.24 compared to female candidates who had a mean score of 27.01.
(ii)   Male candidates had a better spread in scores distribution than the females.
(iii)   There were more male candidates than female who sat for the Mathematics paper in the year 2012 KCPE examination.

Table 11: Performance in 2012 KCPE Mathematics on each content area of the syllabus
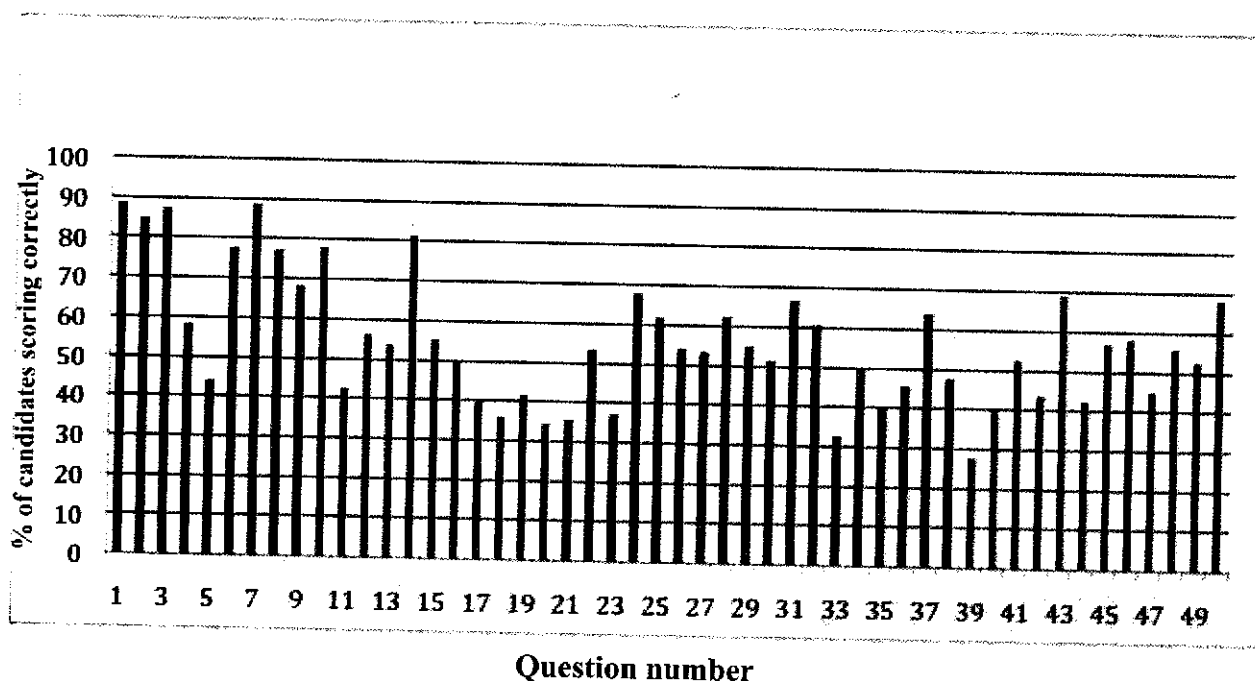
Content Area	No. of Questions	% of candidates scoring correctly
Numbers	13	76.10
Measurement	15	42.36
Geometry	05	67.84
Money	06	52.20
Algebra	05	50.51
Percentage Profit/Loss	03	44.82
Graphs/Tables	03	33.47

From *table 11* above, it can be observed that:

(i)   Candidates performed better in content area involving numbers than in other areas of the syllabus.
(ii)   Candidates performed poorly in content area involving reading and interpreting graphs and tables.

5.2 ANALYSIS OF PERFORMANCE IN SELECTED ITEMS

From *figure 5* below, it can be noted that only one question (item) recorded a facility index of less than 30%. However, there are questions which had a facility index of 40% and below. Some of these questions shall be considered for detailed discussion and analysis.

Question number

The discussion below will focus on analysis based on the concept and skills the items tested and the cognitive processes the candidates presumably underwent to arrive at the correct responses or incorrect responses.

Question 17
A company gives a commission on sales above sh 100 000. In a certain month a salesgirl received a commission of sh 36 000 after selling goods worth sh 800 000. What was the percentage commission offered?

A. 36

B. 4

C. $4\frac{1}{2}$

D. $5\frac{1}{7}$

Response Pattern for Question 17

Option	A	B	C	D*
%Choosing option	14.81	16.49	27.50	39.68
Mean mark in other questions	20.64	23.44	25.76	34.83

The question tested candidate's knowledge on how to obtain percentage commission from sales. Candidates were required to find the commissionable sales i.e. sh 800 000 – sh 100 000 = sh 700 000. The candidates were then required to divide sh 36 000 by sh 700 000 multiplied by 100%. The correct response is **D** ($5\frac{1}{7}$) chosen by bright candidates as shown by the mean mark of **34.83** in other questions. The candidates who chose option **A (36)** divided the commission by sh 100 000. Option **B (4)** was chosen by

those candidates who added sh 100 000 to sh 800 000 instead of subtracting. Those who chose Option C ($4\frac{1}{2}$) did not subtract sh 100 000 from sh 800 000.

Teachers are advised to not only impart knowledge but also guide their pupils in comprehension of given tasks in a question accordingly.

Question 18

Paint was stored in three containers of 48 litres, 72 litres and 30 litres. The paint in each container was then repacked into smaller containers. The amount of paint in each of the smaller containers was the same. What was the capacity of the largest container used to repack the paint?

A.   3 litres
B.   6 litres
C.   72 litres
D.   720 litres

Response pattern for question 18

Option	A	B*	C	D
%Choosing option	8.17	36.20	25.01	29.07
Mean mark in other questions	23.15	32.64	24.84	27.17

The question tested on application skills in the concept of Greatest Common Divisor (GCD). The correct option is **B (6 litres)** chosen by the bright candidates as shown by mean mark of **32.64** in other questions. The candidates who chose option **A (3 litres)** gave the smallest container used to repack the paint instead of the largest. Those who chose option **C (72 litres)** merely took the largest container out the three capacities given in the question while, those who chose option **D (720 litres)** worked out the Least Common Multiple (LCM).

Teachers are advised to offer pupils more application situations involving LCM and GCD/HCF in order to help correction of misconceptions that may arise.

Question 20

The mean mass of four pupils was 49.5 kg. When the masses of another pupil and a teacher were included, the mean mass became 53 kg. If the mass of the pupil was 16 kg less than that of the teacher, what was the teacher's mass?

A. 44 kg
B. 52 kg
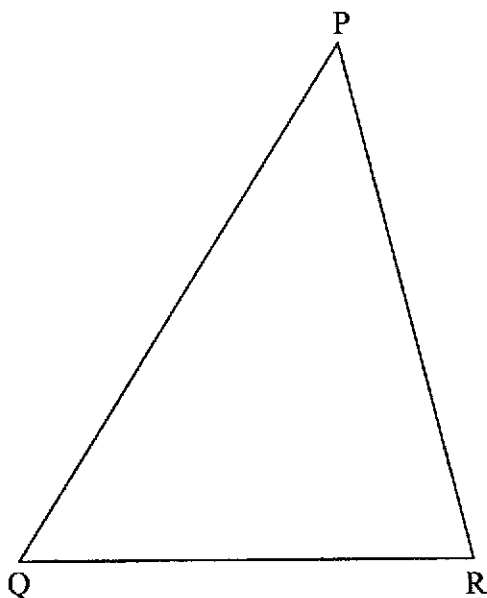C. 76 kg
D. 68 kg

Response pattern for question 20

Option	A	B	C	D*
%Choosing option	21.82	21.12	21.12	34.30
Mean mark in other questions	23.37	25.36	27.82	33.43

The question tested on the candidates' knowledge on mean of given data. The correct option was **D (68 kg)** chosen by bright candidates as shown by the mean mark of **33.43** in other questions. The candidates who chose option **A (44 kg)** merely subtracted 16 from 60 while those who chose option **C (76 kg)** added 16 to 60. The candidates who chose option **B (52 kg)** gave the mass of the pupil.

Teachers are advised to put more emphasis on word problems involving measures of averaging (i.e. mean, mode and median) during remedial teaching.

Question 21

On the triangle PQR drawn below, construct line RS parallel to line QP. Draw a perpendicular from P to meet line RS at T.

What is the length of the line PT?
A. 4.8 cm
B. 5.1 cm
C. 6.8 cm
D. 9.5 cm

Response pattern for question 21

Option	A	B*	C	D
%Choosing option	32.93	35.59	24.31	5.62
Mean mark in other questions	27.29	32.41	24.90	22.18

The question tested candidates' construction skills; in particular how to draw perpendicular and parallel lines. Candidates were required to draw parallel line to a given line QP and then draw a perpendicular

line from point P to line RS using a ruler and a pair of compasses. The correct response was option **B** **(5.1 cm)**.

Majority of the candidates, **35.59%** with a mean mark of **32.41** in other questions chose this option. The candidates who chose option **A (4.8 cm)** measured line RT and those who chose option **C (6.8 cm)** measured line PT. The group of candidates who chose option **D (9.5 cm)** measured line QT.

Teachers are advised to guide pupils in basic construction skills and give extra supervised practice sessions to enable them master the required skills.

Question 23

A farmer harvested 900 bags of maize. She sold
0.7 of the bags and gave 0.1 of the remainder to
a charitable organization. She then kept the rest.
How many bags of maize were kept?
A. 27
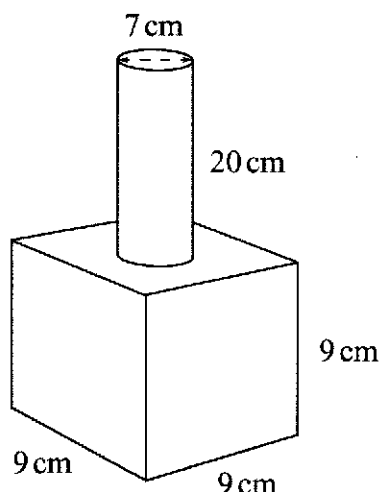B. 180
C. 243
D. 270

Response pattern for question 23

Option	A	B	C*	D
%Choosing option	12.90	27.76	37.13	20.44
Mean mark in other questions	22.76	26.76	34.13	23.16

The question tested on candidate's ability to interpret a word problem involving fractions. The correct response was option **C (243)**. Candidates were required to get the total number of bags sold and plus those the farmer gave to a charitable organization i.e. $(900 \times 0.7) + (0.1 \times 0.3) = 657$ bags. Thereafter the candidates were then required to find the number of bags the farmer kept i.e. $900 - 657 = 243$ bags. The candidates who chose option **A (27)** merely found the number of bags given to the charitable organization while those who chose option **B (180)** misread the statement *"0.1 of the remainder"* to mean *"gave 0.1 to the charitable organization"*. Those who chose option **D (270)** ignored the number of bags given to the charitable organization.

Teachers are advised to put more emphasis on word problems involving operations on whole and decimal numbers during remedial teaching.

Question 39

The diagram below represents a metal solid made up of a cylindrical bar fixed onto a cube. The cylindrical bar is 20 cm long and has a diameter of 7 cm. Each side of the cube is 9 cm long.

7 cm

20 cm

9 cm

9 cm

9 cm

The surface of the solid was painted. What area in cm² was painted? (Take $\pi = \frac{22}{7}$)

A. 1499
B.   964.5
C.   926
D.   845

Response pattern for question 39

Option	A	B	C*	D
%Choosing option	18.79	38.92	27.78	12.71
Mean mark in other questions	24.96	27.88	31.50	27.25

The question tested on the candidate's knowledge on finding surface area of combined shapes.
Candidates were required to work out the total surface areas of the top part (i.e. cylinder) and that of the bottom part (i.e. cube) then, subtract double lower part of the cylinder. The correct response was therefore option **C (926)** which was chosen by **27.78%** of the candidates who sat for the examination. Majority of the candidates **(38.92%)** choose option **B (964.5)**. These were candidates who did not subtract double the lower part of the cylinder. Those who chose option **A (1499)** worked out volume of the solid instead of surface area. The candidates who chose option **D (845)** did not consider the base area of the solid for painting.

5.3   GENERAL COMMENTS

From the above analysis it can be noted that:

5.3.1   There was only one question with a facility index of 30% and below while five questions had a facility index of 80% and above. This implies that there was only one question that was too difficult and five question that were too easy for the candidates.

5.3.2   The difficult question that registered a facility index of 30% and below was from surface area of combined shapes. This is area therefore teachers should deal on with much care while teaching.

5.3.3   Most candidates perform poorly due to low comprehension skills to given tasks during examinations. Teachers are therefore advised to guide there pupils in understanding and interpreting given instructions in the test questions.