6.0 MATHEMATICS

In the year 2014, **879353** candidates sat for the KCPE Mathematics examination. The candidates registered a mean score of **26.02** with a standard deviation of **10.12**. This was a drop in performance when compared to the performance in the year 2013, which had a mean score of **26.43** with a standard deviation of **9.47**.

6.1 GENERAL PERFORMANCE

Table 12: General Performance in Mathematics for the last five years

Year	2010	2011	2012	2013	2014
National Mean	26.90	26.16	28.15	26.43	26.02
Standard Deviation	10.26	10.01	10.51	9.47	10.12

From ***table 12*** above, it can be observed that the performance in 2014 KCPE Mathematics dropped slightly compared to performance in the previous four years both in mean and standard deviation except for the year 2011 and 2013 where the standard deviation was10.01 and 9.47 respectively.

Table 13: General Performance in 2014 KCPE by Gender

Gender	Male	Female
Entry	442,714	436,639
National Raw Mean	26.94	25.09
Standard Deviation	10.52	9.60

From ***table 13*** above, it can be observed that:-

(i) Male candidates performed better with a mean score of 26.94 compared to female candidates who had a mean score of 25.09;

(ii) Male candidates had a better spread in scores distribution with a Standard Deviation of 10.52 compared to the females candidates who registered a Standard Deviation of 9.60;

(iii) There were slightly more female candidates than male who sat for the Mathematics paper in the year 2014 KCPE examination.

Table 14: Performance in 2014 KCPE Mathematics on each content area of the syllabus

Content Area	No. of Questions	% of candidates scoring correctly
Numbers	11	58.15
Measurement	15	42.56
Geometry	07	56.79
Money	04	46.42
Algebra	04	47.50
Percentage Profit/Loss	04	52.84
Graphs/Tables/Averages/Scale Drawing	05	48.92

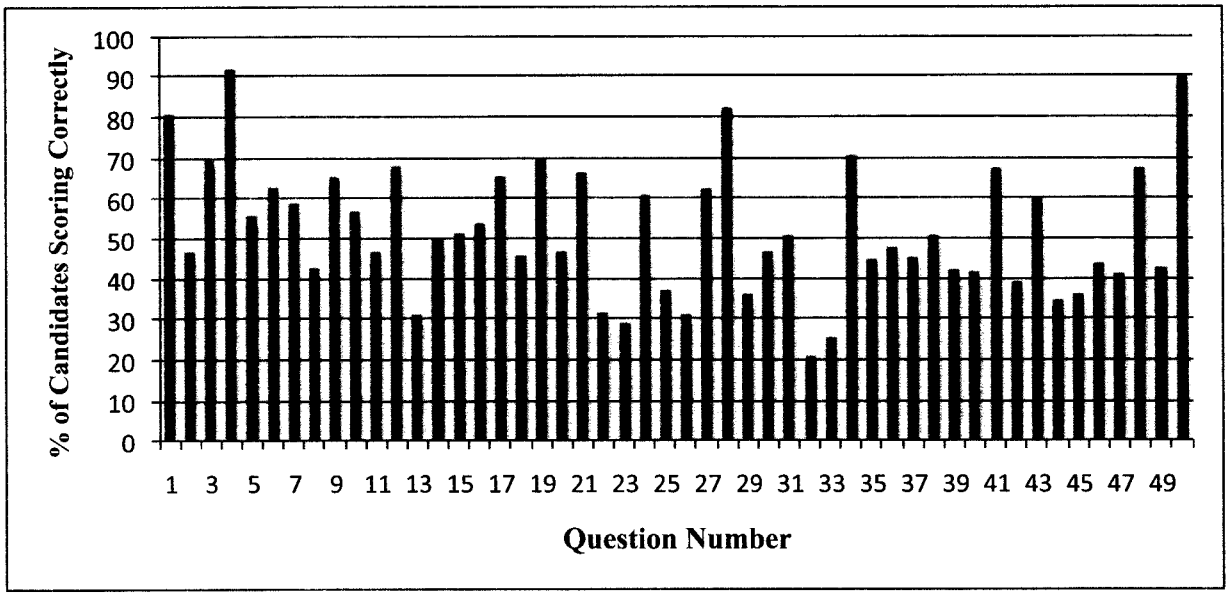
From ***table 14*** above, it can be observed that:

(i) Candidates performed better in content area involving numbers than in other areas of the syllabus.
(ii) Candidates performed poorly in content area involving measurement.
(iii) There were more questions set in Measurement and numbers than in other areas due to the higher content coverage in those areas in the syllabus.

6.2 ANALYSIS OF PERFORMANCE IN SELECTED ITEMS

From ***figure 8*** below, it can be noted that only three questions recorded *a facility index of less than 30%* an indicator poor performance. These questions and four other questions that recorded *a facility index of less than 35%* shall be considered for detailed discussion and analysis.

Figure 8



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. (*) denotes the correct response to the question under discussion.

Question 13

Tuku spent $\frac{1}{3}$ of his money on school uniforms, $\frac{1}{4}$ on books, $\frac{2}{3}$ of the remainder on food and saved the rest. What total fraction of his money did he save and spend on books?

A. $\frac{7}{18}$
B. $\frac{5}{18}$
C. $\frac{5}{36}$
D. $\frac{7}{12}$

Response Pattern for Question 13

Option	A*	B	C	D
%Choosing option	30.42	18.77	20.45	28.63
Mean mark in other questions	33.94	23.25	24.33	20.90

The question tested candidate's comprehension skills to tackle word problem on fractions. Candidates were required to work out the fraction Tuku spent on School fees and books. The candidates were then required to work out the fraction spent on food. The rest was then saved.

The correct response is **A (*7/8*)** chosen by bright candidates as shown by the mean mark of **33.94** in other questions. The candidates who chose option **B (*5/18*)** only considered the fraction spent on food. Option **C (*5/36*)** was chosen by those candidates who did not work out the total spent on saving and books. The candidates who chose option **D (*7/12*)** merely worked out on what was spent on School fees and books.

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

Question 22

A car dealer was left with sh 855 000 after paying out a 5% commission to an agent for the sale of a car. What was the selling price of the car?

A. sh 17 100 000
B. sh 900 000
C. sh 897 750
D. sh 812 250

Response pattern for question 22

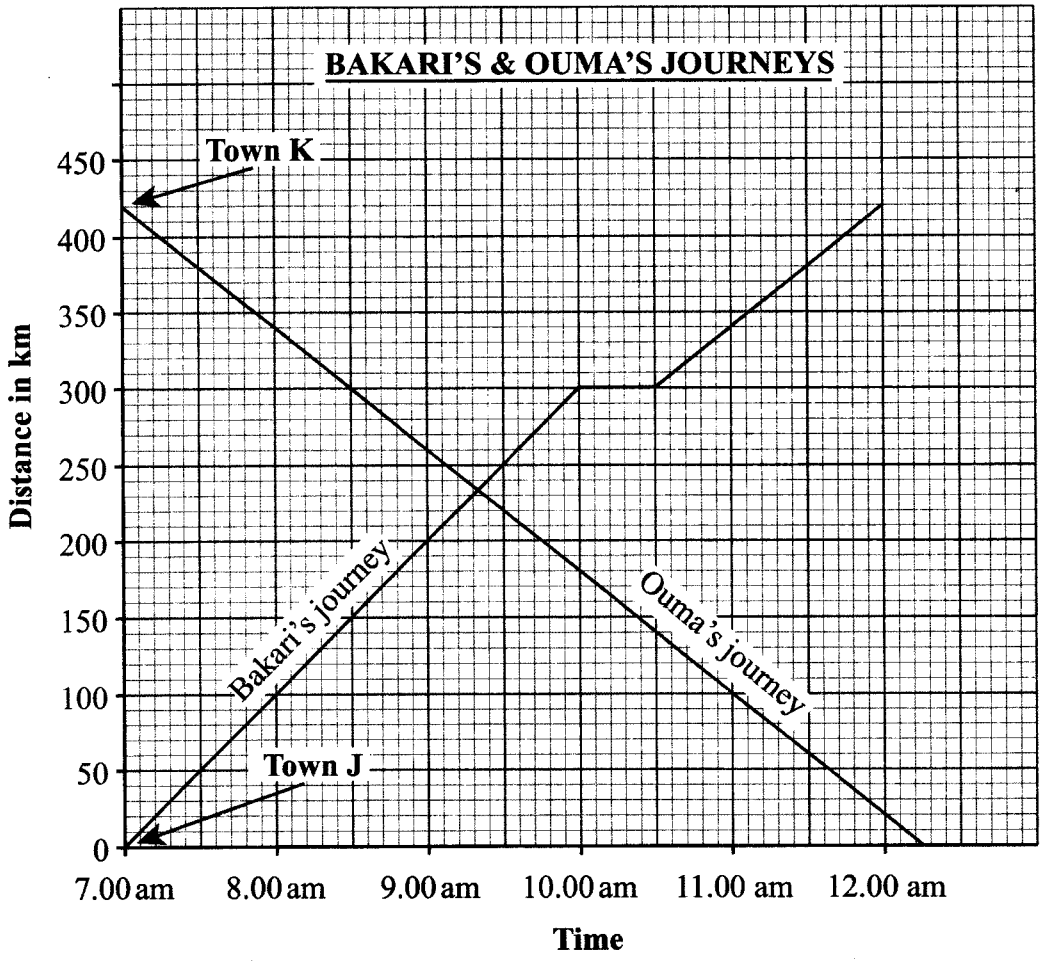
Option	A	B*	C	D
%Choosing option	19.00	30.61	31.57	17.31
Mean mark in other questions	25.40	32.59	22.43	22.08

The question tested on application skills on the concept of buying and selling involving commission. Candidates were required to work out the selling price of the car (100/95 × 855 000). The correct option is therefore option **B (sh 900 000)** chosen by bright candidates as shown by the mean mark of **32.59** in other questions. The candidates who chose option **A (sh 17 100 000)** misread sh 855 000 as the 5% commission. Those who chose option **C (sh 897 750)** misinterpreted 5% as the profit. The candidates who chose to option **D (sh 812 250)** regarded sh 855 000 as the marked price and the 5% commission as discount.

Teachers are advised to involve their pupils in activities involving money (buying and selling, commission).

Question 23

Below is a graph showing the journeys made by Bakari and Ouma. Both started at 7.00 am; Bakari started from town J to town K while Ouma started from town K to town J.



After travelling for 3 hours, Bakari rested for 30 minutes. How far from town J was Ouma when Bakari started his rest?

A. 300 km
B. 240 km
C. 180 km
D. 140 km

Response pattern for question 23

Option	A	B	C*	D
%Choosing option	31.48	25.66	28.28	12.94
Mean mark in other questions	24.92	23.47	30.50	24.94

The question tested on the candidates' reading and interpreting skills on travel graphs. The correct option is **C (180 km)** chosen by bright candidates as shown by the mean mark of **30.05** in other questions chosen by **28.28%** of the candidates in the sample. The candidates who chose option **A (300 km)** merely considered the distance travelled by Bakari before he rested while those who chose option **B (240 km)** considered the distance Ouma was from town J when Bakari restarted his journey after resting. The candidates who chose option **D (140 km)** merely worked out how far Ouma was from town K instead of town J when Bakari started his journey.

Teachers are advised encourage pupils to do more practice on reading and interpreting travel graphs.

Question 26

Kibet left school by bicycle at 8.00 am and took $1\frac{1}{2}$ hours to reach the market 20 km away. Akinyi left the school for the market by car at 8.30 am. The average speed of the car was 80 km/h. What was the difference between their arrival times?

A. 1 hour 15 minutes
B. 45 minutes
C. 30 minutes
D. 15 minutes

Response pattern for question 26

Option	A	B*	C	D
%Choosing option	23.08	30.13	25.92	19.08
Mean mark in other questions	24.51	30.65	22.72	25.44

The question tested candidates' knowledge on the concepts of distance, time and speed. Candidates were required to determine the time Kibet and Akinyi arrived at the market i.e. 9.30 am and 8.45 am respectively. The correct response was option **B (45 minutes).** This option was chosen by the bright candidates as shown by the mean mark of **30.65** in other questions. The option was chosen by **30.13%** of the candidates in the sample. The candidates who chose options **A (1 hour 15 minutes)** disregarded the fact that Akinyi left the school for the market at 8.30 am. The candidates' understanding was that both Kibet and Akinyi left for the market at 8.00 am. The candidates who chose option **C (30 minutes)** merely worked out the difference between the time of departure by Kebet and Akinyi. Those who chose option **D (15 minutes)** only worked out the time taken by Akinyi to arrive at the market.

Teachers are advised to guide pupils on comprehending concepts regarding distance, time and speed.

Question 32

Kadogo was born on 4th January 2009.
How old was he on 4th March 2011?
A. 2 years 62 days
B. 2 years 61 days
C. 2 years 59 days
D. 2 years 60 days

Response pattern for question 32

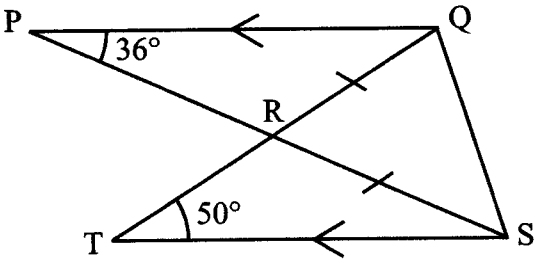
Option	A	B	C	D*
%Choosing option	22.41	20.19	35.71	20.02
Mean mark in other questions	23.37	23.04	28.29	28.33

This question was testing on the reading skills on the Calendar. Candidates were required to know that the month of February has 28 days except for a leap year. The correct response was option **D (2 years 60 days).** This option was chosen by the bright candidates as shown by the mean mark of **28.33** in other questions. The option was chosen by **20.02%** of the candidates in the sample. The candidates who chose options **B (2 years 61 days)** treated the year 2010 as a leap year. The candidates who chose option **A (2 years 62 days)** are those who misconceived that any month of the year has 30 days. Those who chose option **C (2 years 59 days)** disregarded to take into account the 4th January 2009.

Teachers are advised to guide pupils on reading days of the month and concept of a leap year.

Question 33

In the figure below, lines PQ and TS are parallel. Lines RQ and RS are equal.
Angle QPR = 36° and angle STR = 50°.



What is the size of angle PQS?
A. 47°
B. 86°
C. 94°
D. 97°

Response pattern for question 33

Option	A	B	C	D*
%Choosing option	17.16	25.20	31.23	24.55
Mean mark in other questions	23.73	22.51	23.48	34.78

The question tested on the candidates' knowledge on properties of parallel and transversal lines. Candidates were required to have recognized that angle QTS = angle PQT = 50° (alternate angle) and that base angles in an isosceles triangle are equal. The correct response was option **D (97°).** This option was chosen by the bright candidates as shown by the mean mark of **34.78** in other questions. The option was chosen by **24.55%** of the candidates in the sample. The candidates who chose options **A (47°)** worked out angle TQS only. The candidates who chose option **B (86°)** merely worked out angle PRT while the candidates who chose option **C (94°)** worked out the sum of base angles of isosceles triangle QRS without dividing by 2 to obtain one of the base angles.

Question 44

A lorry was packed with cartons each containing packets of cooking fat. There were packets of 500 g and 250 g. The total mass of the packets was 900 kg. If the number of 500 g packets was 1000, what was the number of 250 g packets?

A. 1 600
B. 800
C. 400
D. 100

Response pattern for question 44

Option	A*	B	C	D
%Choosing option	33.97	21.34	29.98	12.76
Mean mark in other questions	30.41	23.90	24.61	21.95

The question tested on the candidates' skills on operating word problem on whole numbers. They needed to be equipped with the knowledge of conversion units involving mass. All the masses given were to be converted to grams. The candidates needed to determine the total mass for the 250g packets then divide by 250. The correct response is option **A (1600)** chosen by 33.97% of the candidates who were the bright candidates as shown by the mean mark of 30.41 in other questions. The candidates who chose option **B (800)** correctly obtained the total mass for the 250g packets as 400 000g but divided by this mass by 500 instead of 250. Those who chose option **C (400)** only worked out the total mass for the 250g packets in kilograms while those who chose option **D (100)** were either guessing or subtracted 1000 the number of 500g packets and 900 the total mass of all the packets.

6.3 GENERAL COMMENTS

From the above analysis it can be noted that:

6.3.1 There were three questions with a facility index of 30% and below while four questions had a facility index of 80% and above. This implies that there were three questions that proved to be too difficult and four questions that were too easy for the candidates.

6.3.2 The difficult questions that registered a facility index of 30% and below were from travel graph, calendar and properties of parallel lines. These are areas; therefore, teachers should deal on with much emphasis while teaching.

6.3.3 Other areas that require attention of both teachers and pupils are measurement and algebra.

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