6.0 MATHEMATICS

In the year **2015, 927136** candidates sat for the **KCPE Mathematics examination**. The candidates registered a mean score of **28.08** with a standard deviation of **10.77**. This was an improvement in performance when compared to the performance in the year **2014**, which had a mean score of **26.02** with a standard deviation of **10.12**.

6.1 GENERAL PERFORMANCE

Table 14: General Performance in Mathematics for the last five years

Year	2011	2012	2013	2014	2015
National Mean	26.16	28.15	26.43	26.02	28.08
Standard Deviation	10.01	10.51	9.47	10.12	10.77

From *table 14* above, it can be observed that the performance in **2015 KCPE Mathematics** improved significantly compared to performance in the previous year's both in mean and standard deviation. This year's performance can be compared to that of the year 2012 which had mean performance of **28.15** with a standard deviation of **10.51**.

Table 15: General Performance in 2015 KCPE by Gender

Gender	Male	Female
Entry	467,581	459,554
National Raw Mean	29.11	27.04
Standard Deviation	11.00	10.43

From *table 15* above, it can be observed that:-

(i)   Male candidates performed better with a mean score of **29.11** compared to female candidates who had a mean score of **27.04**;

(ii)   Male candidates had a better spread in scores distribution with a Standard Deviation of **11.00** compared to the females candidates who registered a Standard Deviation of **10.43**;

(iii) There were slightly more male candidates than female who sat for the Mathematics paper in the year 2015 KCPE examination.

Table 16: Performance in 2015 KCPE Mathematics on each content area of the syllabus

Content Area	No. of Questions	% of candidates scoring correctly
Numbers	12	61.45
Measurement	10	52.35
Geometry	07	42.41
Money	09	52.69
Algebra	04	49.28
Percentages, percentage Profit/Loss & proportions	03	63.30
Graphs	02	82.57
Tables	02	51.57
Averages	01	57.75

From *table 16* above, it can be observed that:

(i)   Candidates performed better in content area involving: percentages, percentage profit/loss & proportions, than in other areas of the syllabus.

(ii)   Candidates performed poorly in content area involving geometry.

6.2   ANALYSIS OF PERFORMANCE IN SELECTED ITEMS

From *figure 8* below, it can be noted that three questions recorded *a facility index of less than 30%* an indicator poor performance. These questions and two other questions that recorded *a facility index of less than 35%* shall be considered for detailed discussion and analysis.
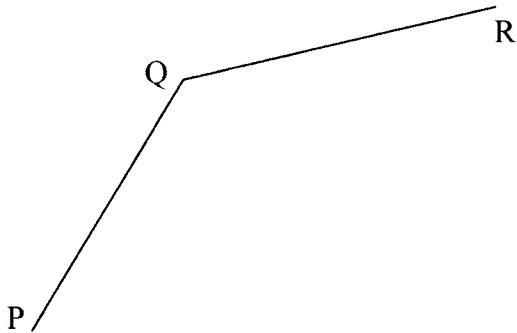
Figure 8
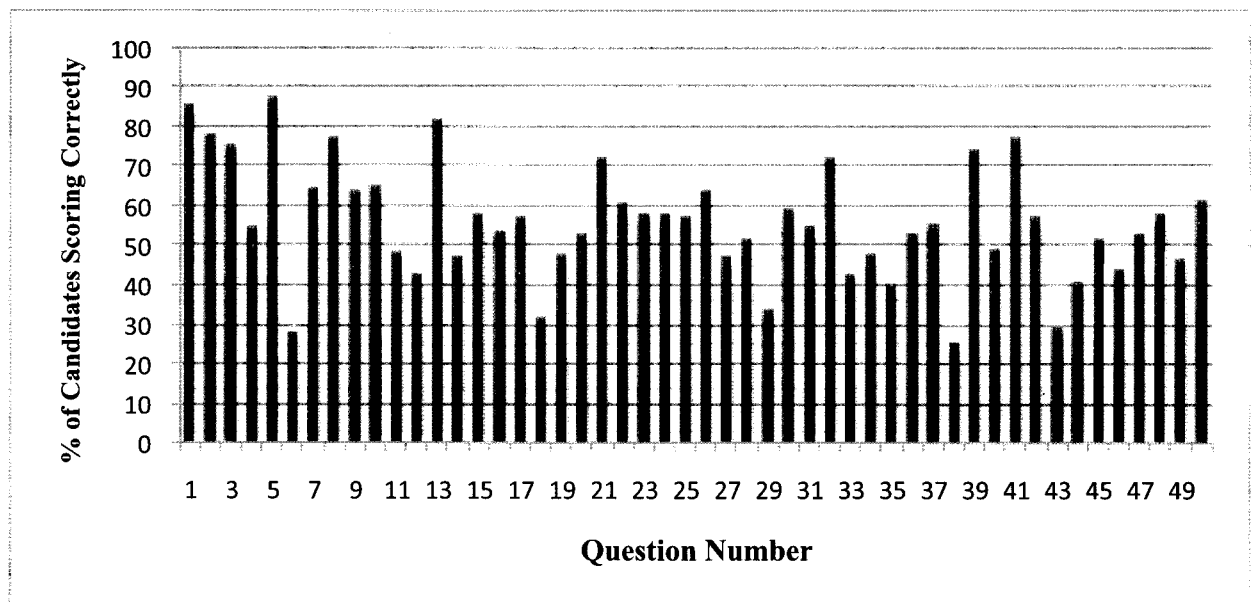
The discussion below will focus on analysis based on the concept and skills the items tested and the cognitive processes the candidates presumably underwent to arrive at the correct responses or incorrect responses. (*) denotes the correct response to the question under discussion.

Question 6

What is the measure of the reflex angle
PQR drawn below?

A. 315°
B. 225°
C. 135°
D. 45°

Response Pattern for Question 6

Option	A	B*	C	D
%Choosing option	8.21	27.72	43.26	19.16
Mean mark in other questions	28.07	35.72	26.35	21.30

The question tested candidate's ability to measure angles. Candidates were expected to comprehend and differentiate between an acute angle, obtuse angle and reflex angle. The obtuse angle PQR when measured is *135°* while Reflex angle PQR is *225°*.

The correct response is **B (225°)** chosen by bright candidates as shown by mean mark of *35.72* in other questions. The candidates who chose option **C (135°)** obtained the obtuse angle. Option **D (45°)** was chosen by those candidates who gave the acute angle instead of reflex angle. The candidates who chose option **A (315°)** subtracted the acute angle from 360°.

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

Question 18

Pupils contributed some money to help
needy people. They bought twenty four 2-kg
packets of flour, thirty six 1-kg packets
of flour and a fifty kilogram bag of sugar.
The flour was packed in 500 g packets and
the sugar in 250 g packets. How many
people got both a packet of flour and a
packet of sugar?
A. 368
B. 200
C. 168
D. 120

Response pattern for question 18

Option	A	B	C*	D
%Choosing option	35.59	15.90	31.54	15.14
Mean mark in other questions	31.61	22.75	29.61	22.66

The question tested on the concept of mass under the topic measurement. Candidates were required to work out the total mass for flour and that of sugar contributed for the needy people. Thereafter work out the number of packets for flour and sugar given to the needy people.

The correct option is therefore option **C (168)** chosen by bright candidates as shown by the mean mark of *29.61* in other questions. The candidates who chose option **A (300)** added the number of packets for four *(168)* and the number of packets for sugar *(200)* given to the needy people. Those who chose option **B (200)** worked out the number of packets for sugar. The candidates who chose option **D (120)** disregarded the fact that each packet of the twenty four packets of flour contributed weighed 2 kilograms.

Teachers are advised to guide pupils in interpreting the meaning of *2-kg* and *1-kg*. This is purely comprehension skills.

Question 29

What is the difference in value between
the largest and the smallest 6-digit number
formed using the digits 3, 0, 4, 5, 2, 9?
A. 954320
B. 203459
C. 930861
D. 750861

Response pattern for question 29

Option	A	B	C	D*
%Choosing option	19.00	12.37	33.70	33.29
Mean mark in other questions	20.09	21.50	29.10	34.25

The question tested on the candidates' knowledge on place value. The correct option is **D (750861)** chosen by bright candidates as shown by the mean mark of *34.25* in other questions. This option was chosen by *33.29%* of the candidates. The candidates who chose option **A (954320)** merely considered the largest 6-digit number of the digits in the number given while, those who chose option **B (203459)** considered the smallest number. The candidates who chose option **C (930861)** worked with *023459* instead of *203459*. Digit 0 in the number *023459* has no value, hence not a 6-digit number.

Teachers are advised to guide pupils in interpreting total value of a digit in a number.

Question 38

The table below shows the postal charges, in shillings, on small packets in a certain year.

Mass of Packet	East Africa	Rest of Africa	Rest of the World
Not over 20 g	39.00	44.00	58.00
Not over 100 g	88.00	160.00	144.00
Not over 250 g	177.00	204.00	265.00
Not over 500 g	309.00	365.00	472.00
Not over 1 kg	519.00	608.00	758.00
Not over 2 kg	718.00	840.00	1 099.00
Each additional 1 kg up to 5 kg	354.00	420.00	543.00

Abbas from Mombasa sent the following packets:

A 900g packet to Uganda
A 5kg packet to Ghana
A 251g packet to China

How much money did he pay altogether?

A. sh 3 091
B. sh 2 884
C. sh 2 881
D. sh 1 831

Response pattern for question 38

Option	A*	B*	C	D
%Choosing option	25.05	22.10	23.00	27.75
Mean mark in other questions	34.18	24.14	26.15	27.57

The question tested candidates' knowledge on interpretation of tables. Candidates were required to determine the postal charges for sending small packets to Uganda (*sh 519*), Ghana *(sh 2100)* and China *(sh 472)* by Abbas. The correct response was option **A (sh 3091).** This option was chosen by the bright candidates as shown by the mean mark of **34.18** in other questions. The option was chosen by **25.05%** of the candidates. The candidates who chose options **D (sh 1831)** disregarded the *extra 3kg* on the *5kg* packet to China. The candidates instead worked with the first 2kg only.

Teachers are advised to engage pupils on activities involving postage of parcels at the post office.

Question 43

A plot of land is in the shape of a rhombus
of side 200 m. The length of one of the
diagonals is 240 m. What is the area of the
plot in hectares?
A. 3.84
B. 4
C. 4.8
D. 7.68

Response pattern for question 43

Option	A*	B	C	D
%Choosing option	28.83	18.24	40.03	10.90
Mean mark in other questions	34.47	25.43	25.22	26.87

This question was based on conversion of area in square metres into hectares. Candidates were required to use Pythagorean relation to work out half the length of the other diagonal **(160 metres)**. The correct working was $\frac{1}{2} \times \frac{120 \times 160 \times 4}{10000}$ = *3.84 ha.*

The correct option is therefore Option **A (38.4)** chosen by bright candidates as shown by the mean mark of **34.47** in other questions. Option **B (4)** was chosen by candidates who misconceived that two sides of the rhombus meet at a right angle. The candidates who chose Option **C (4.8)** misconceived that the two diagonals of the rhombus are equal. The **10.90%** candidates who chose Option **D (7.68)** merely guessed.

Teachers are advised to give pupils more exercises involving conversion of units.

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 *three* questions had a facility index of *80%* and above. This implies that there were *three* questions that proved to be too difficult and *three* 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: Measuring angles (use of protractor); Postal charges; and Area of quadrilaterals. These are areas teachers are required to emphasis on during teaching.

6.2.3 The easy questions that registered a facility index of *80%* and above were from: Finding mass of quantities and total value of a digit in a given number.

6.2.4 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 during examinations.