

Name.....

Index No...../.....

School.....

Date

Candidate's Signature.....

121 /2

MATHEMATICS

PAPER 2

JUNE /JULY 2012

2 ½ HRS

BUTERE DISTRICT JOINT EVALUATION – 2012

Kenya National Examination Council (K.C.S.E)

121 /2

MATHEMATICS

PAPER 2

JUNE /JULY 2012

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INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided at the top of this page.
2. Sign and write the date of examination in the spaces provided above.
3. This paper consists of two sections: Section I and Section II.
4. Answer ALL questions in section 1 and ONLY FIVE questions from section II
5. All answers and workings must be written on the question paper in the spaces provided each question.
6. Marks may be given for correct working even if the answers are wrong.
7. Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.
8. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

FOR EXAMINERS USE ONLY

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Section II

17	18	19	20	21	22	23	24	TOTAL

**GRAND
TOTAL**

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*This paper consists of 16 printed pages.
Candidates should check the question paper to ensure that all
pages are printed as indicated and no questions are missing*

SECTION 1 (50 MARKS)
Answer all the questions in this section.

1. Use logarithms correct to 4 decimal places, to evaluate.

$$\frac{6.373 \log 4.948}{\sqrt{0.004636}}$$

(3 marks)

2. Rationalize the denominator and write the following in the form $\frac{1}{c} (a + \sqrt{b}) (d + \sqrt{e})$ where

a,b,c,d and e are constants. $\frac{3 - \sqrt{7}}{\sqrt{6+1}}$

(3 mks)

3. Without using tables or calculators evaluate.

$$\frac{3.2 \div 2.5 \text{ of } 0.16}{1.52 + 1.24 \times 2.6 \div 1.3}$$

(3mks)

4. Solve the inequalities $\frac{1}{2}x - 2 < -2x + 1 \leq -2x + 1 \leq \frac{2}{5}x$ and show your solution on a number line. (3 mks)

5. The principal of Butere High School, decided to have a charity walk to raise money to build a dormitory. She will cover 10km on the first day. Thereafter, she will cover 2 km more than the previous day.
Find:
a) The distance she will travel on the 13th day. (1 mks)

- b) How many days she will require to cover a total of 400km. (2 mks)

6. Find the x – coordinates of the points on the curve $y = 3x^3 + 18x^2 + 2x + 3$ at which the gradient is 2. (3 marks)

7. The transformations X and Y have the matrices $\begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix}$ and $\begin{pmatrix} 1 & -1 \\ -2 & 1 \end{pmatrix}$, respectively. Find the image A' B' of AB where, A (2,2) and B (5,4), Under the combined transformation YX. (3mks)

8. A school bus was valued at sh 6,000,000 in January 2000. Each year, its value decreased by 12.5% of its value at the beginning of the year. Find the value of the bus in January 2005, giving your answer correct to 4.s.f (3 mks)

9. The length and breath of a rectangular card were measured to the nearest millimeter and found to be 14.5 cm and 10.6 cm respectively. Find the percentage error in the perimeter. (3mks)

10. Solve the following equation;

$$\sin (2\theta - 30^\circ) = \frac{\sqrt{3}}{2} \text{ for } 0^\circ \leq \theta \leq 180^\circ \quad (3\text{mks})$$

11. a) Draw a line AB = 8.6 cm with A as the centre draw a circle radius 3 cm. Draw a tangent from B to the circle. (3 mks)

- b) Measure the length of this tangent (1mks)

12. Make x the subject of the formula.

$$H = n \sqrt{\frac{t + kx}{t - Kx}} \quad (3\text{mks})$$

13. A circle of radius 7 units has its centre at the point of intersection between the lines $x + 2y + 1 = 0$ and $2x + 3y - 3 = 0$
Find the equation of the circle expressing it in the form $x^2 + y^2 + gx + fy + c = 0$ (3mks)

14. a) Expand $(3x - \frac{1}{3}y)^4$ fully (1mk)

- b) By substituting suitable values of x and y in your expansion, obtain the value of $(29.5)^4$ to 4 significant figures. (2 mks)

15. A translation maps a point $P(3,2)$ onto $P'(5,-4)$.

a) Determine the translation vector.

(1mk)

b) A point Q' is the image of the point $Q(2,5)$ under the same translation. Find the length of $P'Q'$ leaving the answers in surd form.

(2mks)

16. Two grades of tea, costing sh 100 and 150 per kg respectively are mixed in the ratio 3:5 by weight. The mixture is then sold at sh. 160 per kg. Find the percentage profit on the cost price.

(4 mks)

SECTION II (50 MARKS)

Answer only five questions in this section in the spaces provided.

17. In a safari rally drivers are to follow a route PQRST. Q is 375 km from P on a bearing of 075° , R is 105 km from Q and on a bearing of 110° from Q. The bearing of T from S is 040° and a distance of 450 km.
- a) By using a scale of 1 cm to represent 30 km, draw a well labeled diagram to represent the route PQRST. (4mks)
- b) Hence determine.
- i) The distance of P from R. (2mks)
- ii) The bearing of Q from R. (1mk)
- iii) The distance and bearing of P from S. (2 mks)
18. A cupboard has 7 white cups and 5 brown cups all identical in size and shape. There is a blackout in the town and Mrs. Wafula has to select three cups one after the other without replacing the previous ones.
- a) Draw a tree diagram for the information. (2mks)

- b) Calculate the probability that she chooses.
 i) Two white cups and one brown cup (2mks)

- ii) Two brown cups and one white cup. (2mks)

- iii) At least one white cup. (2 mks)

- iv) Three cups of the same colour (2mks)

19. In a botanical experiment, the length of 60 leaves of a certain type of a tree were measured correct to the nearest 0.1 cm.

Length (cm)	3.0 – 3.4	3.5 – 3.9	4.0 – 4.4	4.5 – 4.9	5.0 – 5.4	5.5 – 5.9	6.0 – 6.4	6.5 – 6.9	7.0 – 7.4
No. of leaves	1	4	9	14	12	10	6	3	1

- a) State the modal class (1mk)

- b) Calculate the median length (3 mks)

c) Using a working mean of 5.2 find;

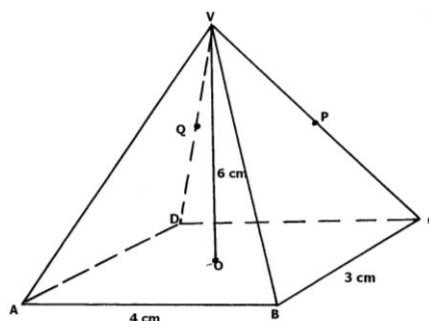
i) The mean

(4mks)

ii) The standard deviation

(2mks)

20. The diagram below shows a right pyramid VABCD, v as the vertex. The base of pyramid is a rectangle ABCD, with $AB = 4\text{CM}$ and $BC = 3\text{CM}$. The height of the pyramid is 6 cm.



a) Calculate the

i) Length of the projection of VA on the base and the angle it makes with the base.

(4mks)

ii) Angle between the face VAB and the base.

(2mks)

b) P is the midpoint of VC and Q is the midpoint of VD. Find the angle between the plane VAB and the plane ABPQ.

(4 mks)

21. A company wishes to buy two types of squash machines; Electric and manual. A manual machine requires 4 attendants whereas an electric one requires two. An electric machine fills 300 packets per hour; a manual one can fill 200 packets per hour. At least 3000 packets need to be filled per hour and the number of attendants should not exceed 40.

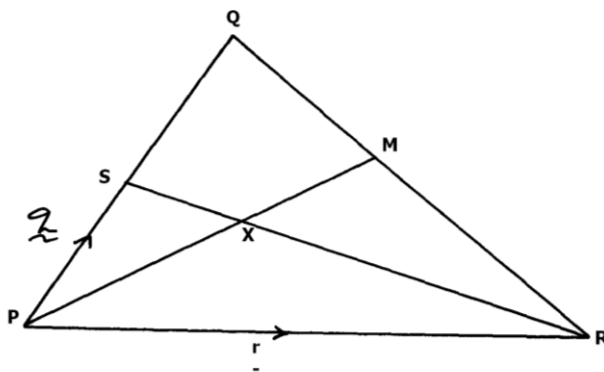
- a) Write down inequalities to describe these conditions and graph them. (7mks)
- b) If for every hour it is used, an electric machine brings a profit of shs. 200 and a manual one shs. 500, determine the number of machines of each type that should be installed in order to maximize profit per hour.
- c) Find the maximum profit (1mk)

22. a) Draw the graph of $Y = -x^2 + 2x + 8$ for $-2 \leq x \leq 4$ (3 marks)

- b) Use 6 trapezia to estimate the area enclosed by the curve $y = -x^2 + 2x + 8$, the line $x = -2$ and $x = 4$ and the x - axis

- c) Hence find the percentage error in area of (b) above and the exact area. (4 mks)

23. In the figure below $PQ = q$ and $PR = r$ $QM:MR = 1:2$. The point S is the midpoint of PQ . X is the intersection of PM and SR . $SX = hSR$, $pX = kPM$ where k and h are constants.



Find:

- a) QR in terms of q and r . (1mk)

b) PM in terms of q and r

(2mks)

c) SR in terms of q and r

(1mk)

d) Express SX in two ways in terms of h, r and q and in terms of k, r and q , hence determine the ratio in which x divides SR. (6mks)

24. Two towns A and B lie on the same latitude in the northern hemisphere. When it is 8:00 am at A, the time at B is 11:00 a.m.

a) Given that the longitude of A is 15° E, find the longitude of B. (3 mks)

b) A plane leaves A for B and takes $3\frac{1}{2}$ hours to arrive at B traveling along a parallel of latitude at 850 km/h.

Find:

i) The radius of the circle of latitude on which town A and B lie. (4 mks)

ii) The latitude of the two towns.

Take radius of the earth to be 6371km).

(3mks)