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121/2 Erect MATHEMATICS	Date
PAPER II JULY/AUGUST 2014 2 <sup>1</sup> / <sub>2</sub> HOURS	
MBOONI EAST SUB - COUNTY FORM FOU	<b>UR JOINT EXAMINATION 2014</b>

Kenya Certificate of Secondary Education

MATHEMATICS PAPER II JULY/AUGUST 2014 2 1/2 HOURS

# **INSTRUCTIONS TO CANDIDATES**

- 1. Write your name, index number and class.
- 2. The paper contains two sections: Section I and II
- 3. Answer ALL questions in section I and ANY FIVE questions from section II.
- 4. All working and answers must be written on the question paper in the spaces provided below each question.
- 5. Marks may be awarded for correct working even if the answer is wrong.
- 6. Negligent and slovenly work will be penalized.
- 7. Non-programmable silent electronic calculators and mathematical tables are allowed for use.
- 8. This paper consists16 of printed pages. Candidates should check the question paper to ensure that all the pages are printed indicated and no questions are missing.

## FOR EXAMINER'S USE ONLY

## **SECTION 1**

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

### SECTION II

17	18	19	20	21	22	23	24	TOTAL



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2014 Mbooni East sub – county Form Four Joint Examination 121/2 Mathematics Paper 2



3. (a) Expand  $\left(1 + \frac{3}{x}\right)^5$  upto the fifth term

(2 Marks)

(b) Hence use your expansion to evaluate the value of  $(2.5)^5$  to 3 d.p. (2 Marks)



5. The figure below shows a rectangular based right pyramid. Find the angle between the planes ABCD and ABV. (2marks) V



6. A object A of area  $10 \text{ cm}^2$  is mapped onto its image B of area  $60 \text{ cm}^2$  by a transformation whose matrix is given by  $P = \begin{cases} x & 4 \\ 3 & x+3 \end{cases}$ . Find the possible value of x (3 Marks)

7. The position vector of A and B are  $a = 4i + 4ja^{6}$  6k and b = 10i + 4j + 12k. D is a point on AB such that AD:DB is 2:1. Find the co-ordinates of D  $a^{6}$  (3 Marks)

9. A variable Z varies directly as the square of X and inversely as the square root of Y. Find the percentage change in Z if X increased by 20% and Y decreased by 19% (3 Marks)

10. By rounding each number to the nearest tens, approximate the value of  $\frac{2454 \times 396}{66}$ Hence calculate the percentage error arising from this approximation to 4 significant figures. (3 Marks)

- 11. Find the centre and radius of the circle whose equation is  $2x^2 + 2y^2 8x + 12y 2 = 0$
- 12. In the figure below AB = 8cm and O is the centre of the circle. Determine the area of the circle if angle  $OA = 15^{0.28}$  (3 Marks)



13. Pipe A can fill a tank in 2 hours, pipes B and C can empty the tank in 5 hours and 6 hours respectively. How long would it take(a) To fill the tank if A and B are left open and C closed(2 Marks)

(b) To fill the tank with all the pipes open

(2 Marks)

14. (a) Find the inverse of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ as to be the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the set of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ is the matr	Mathematics paper 2 (1 Mark)
(b) Hence solve the simultaneous equation below using matrix method $tree_{4x + 3y = 6}$ $5y + 3x - 5 = 0$	(3 Marks)

15. Evaluate by rationalizing the denominator and leaving your answer in surd form. (2 Marks)  $\frac{\sqrt{8}}{1+\cos 45^{0}}$ 



16. Form the three inequalities that satisfy the given region R

- <u>SECTION II 50 MARKS</u> Answer any FIVE questions from this section
- 17. Mr. Muema is a teacher and his monthly earnings are a basic salary of Sh. 42,000, a house allowance of Sh. 12,000, medical allowance of Sh. 2, 680 and hardship allowance equivalent of 30% of his basic salary. He is entitled to a personal relief of Sh. 1056 per month. He also has an insurance scheme for which he pays a monthly premium of Sh. 4000. He is therefore entitled to a relief on the premium of 15% of the premium paid. Using the taxation schedule below.

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Rate (%)						
10						
15						
20						
25						
30						
35						

# Calculate

(a) Mr. Muema's taxable pay in K£ p.a.

(2 Marks)





the Mr. Muema's net pay per month.

(2 Marks)

18. (a) Find the table for the curses given by  $y = 3\sin(2x + 30^{\circ})$  and  $y = \cos 2x$  for x values in the range  $0 \le x \le 180^{\circ}$ 

Х	0	15	30	45	60	75	90	105	120	135	150	165	180
$y = 3 \sin(2x + 30)$	1.5		3		1.5		-1.5			-2.60	-1.00		1.5
$y = \cos 2x$	1			0		-0.866		-0.866	-0.5			0.866	1



(c) Use your graph to solve the equation $3 \sin (2x + 30) = \cos 2x$	(1 Mark)
(d) Determine the following from your graph	
(i) Amplitude of $y = 3Sin (2x + 30)$	(1 Mark)
(ii) Period of $y = 3 Sin (2x + 30)$	(1 Mark)
(iii) Period of $y = \cos 2x$	(1 Mark)

- 19. The positions of two towns on the earths surface are A (40<sup>o</sup>S, 45<sup>o</sup>W) and B (40<sup>o</sup>S, 135<sup>o</sup>E) Calculate:
  - (a) The difference in distance between towns A and B along the parallel of latitude and along the great circle (in nm)
     (4 Marks)

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- circle (in nm) (4 Marks)
  (b) Two planes X and Y left town A at 8:00 a.m. flying at 758 knots each towards town B. If plane X flies along the parallel of latitude and plane Y along the great circle; then determine the position of one of the planes when other lands at town B (4 Marks)
  (c) What is the local time at town B when the second plane lands (2 Marks)
- (c) What is the local time at town B when the second plane lands

- 20. The probability of passing KCSE depends on the performance in the KCPE. If the candidate passes the KCPE, the probability of passing KCSE is  $\frac{4}{5}$ . If the candidate fails in the KCPE, the probability of passing KCSE is  $\frac{3}{5}$ . If a candidate passes KCSE the probability that he/she will get employed is  $\frac{5}{8}$ . If he/she fails KCSE the probability of passing KCPE is  $\frac{2}{3}$ . The probability of passing KCPE is  $\frac{2}{3}$ . (a) Draw a well labelled tree diagram to represent the above information. (2 Marks) (b) Using the tree diagram, find the probability that a candidate:-
- (i) Passes the KCSE $\phi^{\gamma}$ (2Marks) (ii) Gets employed  $^{1}$ (2 Marks) (iii) Passes KCSE and get employed (2 Marks) Jes Pot More Free RCSB Past (iv) Passes KOPE and does not get employed (2 Marks)

21. The heights of 100 maize plants were measured to the nearest centimeter and the results recorded in the table shown below.

Height x (cm)	Frequency	d d	al -	fd	fd <sup>2</sup>	cf
25 - 29	5	X		-15		5
30 - 34	12	4.4e		-24		17
35 – 39	18	<u>,</u> - 1	1	-18		35
40 - 44	30 25	0	0	0		65
45 - 49	17	1	1			
50 - 54	11 22	2				
55 - 59	7 5	3				

(a) Complete the table

(b) Calculate to 2 d.p.

(i) The mean

(ii) The standard deviation FOT NOTE Free

(2 Marks)

(2 Marks) (2 Marks)



22. Without plotting estimate the area bounded by  $y = x^2+4$ , the x – axis and the lines x = 1 and x = 3 by using

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- (a) Mid-ordinate rule with 4 strips of equal width (3 Marks)
- (b) Trapezium rule with 4 strips of equal width
- For wore Free KCSB Past Papers Visit work -(c) The percentage error arising from using the Mid-ordinate rule

- (3 Marks)
- (4 Marks)

#### .s. com Mathematics paper 2 23. (a) Construct a parallelogram ABCD in which AB = 9 cm, AD = 5 cm and angle $BAD = 60^{\circ}$ . (2 Marks) (b) Measure the length AC (1 Mark) (b) Measure the length AC (c) Show the locus of point P which moves so that it is equidistant from A to C. (1 Mark) (d) Show the locus of point Q which proves such that angle BQD = $90^{\circ}$ . (2 Marks) (e) The position of point X such that $AX \ge XC$ and angle $BXD = 90^{\circ}$ (2 Marks)

Je Rot More Free KCSB Past papers visit (f) Shade the region inside the parallelogram such that  $AX \ge XC$  and angle  $BXD \ge 900$ 

à

(2 Marks)

(4 Marks)

24. Mumbua owns a restaurant where she stocks two types of drinks called Kazuri and Malezi. The two drinks are produced in cans of the same size. She needs to order fresh supplies and has room for upto 1000 cans. Malezi is more popular and she decides to order at least twice as many cans of Malezi as Kazuri. She wishes however, to have at least 100 cans of Kazuri and not more than 800 cans of Malezi. Taking X and Y to be the number of cans of Kazuri and Malezi respectively;

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- (a) Write down 4 inequalities involving X and Y which satisfy these conditions
- (b) Using a scale 1cm to represent 100 cans on each axis, plot the inequalities and graph them (4 Marks)
- (c) The profit of a can of Kazuri is Shs. 2. Using your graph determine the number of cans of each drink that the shopkeeper should order to give maximum profit (2 Marks)