

NAME: .....  
SCHOOL: .....

INDEX NO: .....  
CANDIDATE'S SIGN: .....  
DATE: .....

121/2  
MATHEMATICS  
PAPER 2  
JULY/AUGUST - 2014  
TIME: 2 ½ HOURS

# MERU COUNTY JOINT EVALUATION EXAM - 2014

Kenya Certificate of Secondary Examination K.C.S.E

121/2  
MATHEMATICS  
PAPER 2  
JULY/AUGUST - 2014  
TIME: 2 ½ HOURS

## INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided above.
2. This paper contains two sections. Section I and II.
3. Answer all the questions in section I and ONLY five in section II.
4. All answers and working 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 calculators and Mathematical tables may be used, except where stated otherwise.

## FOR EXAMINER'S USE ONLY

### Section I

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

### Section II

Question	17	18	19	20	21	22	23	24	Total
Marks									

GRAND TOTAL

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*This paper consists of 16 printed pages.  
Candidates must check to ascertain that all pages are printed as indicated  
and that no question(s) is/are missing.*



SECTION I (50 MARKS)

Answer all the questions in this section

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

(4mks)

$$\frac{43.72 - 0.81}{(0.1463^2 \times 2.47)^{\frac{1}{3}}}$$

2. Make Z the subject of the formula.

(3mks)

$$2x = \left( \frac{wz^2}{y + z^2} \right)^{\frac{1}{3}}$$

3. Tap A can fill a tank in  $2\frac{1}{2}$  hours while tap B can fill the same tank in 4 hours. Tap C empty the full tank in 5 hours. How long will it take for the tank to be completely full if the three taps are opened at the same time and then tap A closed after 2 hours.

(3mks)

4. A closed cone has a base radius of 5cm and a perpendicular height of 12cm. Calculate the surface area of the cone (take  $\pi$  to be 3.142) (3mks)

Solve the equation for  $\theta$

$$5 \sin \frac{5}{2} \theta = 2.5 \text{ in the range } 0^\circ \leq \theta \leq 180^\circ \quad (2\text{mks})$$

6. Find the value of  $y$  given

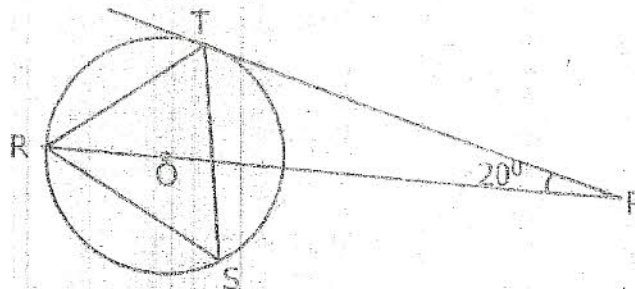
$$\log_4^3 - \frac{1}{2} \log_4 (2y-5)^2 = \frac{3}{2} \quad (3\text{mks})$$



7. Mr. Munyua invested sh 50000 in a micro financial bank which pays interest at a rate of 18% p.a compounded semi-annually. Calculate the number of years it will take for the money to accumulate to sh 83 855. (3mks)

8. A transformation matrix  $\begin{pmatrix} P & 2 \\ 4p-3 & 3p \end{pmatrix}$  maps an object of area  $21\text{cm}^2$  to an image of area  $42\text{cm}^2$ . Determine the value of P. (3mks)

9. In the figure below TP is tangent to the circle at T. Angle  $\text{TPR} = 20^\circ$  and O is the centre of the circle.



Find the size of angle RST

(3mks)

10. Simplify  $\frac{\sqrt{3}}{\sqrt{3}-\sqrt{2}}$  leaving your answer in the form  $a + b\sqrt{c}$  where  $a$ ,  $b$  and  $c$  are constants.

(2mks)

11. (a) Convert  $\frac{2}{11}$  into a decimal to 2 significant figures.

(1mk)

- (b) Hence find the percentage error that occurred in converting into decimal form in (a) above.

(2mks)

12. (a) Expand  $(1 - \frac{1}{2}x)^5$  upto the term in  $x^3$ .

(1mk)

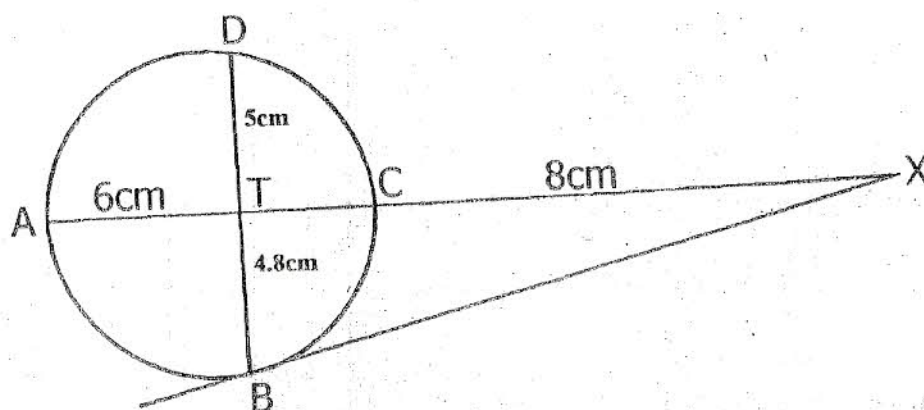
- (b) Use the expansion above to find the value of  $(0.95)^5$

(2mks)

$$9x^2 + 9y^2 - 18x + 6y = 26$$

(3mks)

14. In the figure below BX is a tangent to the circle at B. ATCX and BTD are straight lines. AT = 6cm, CX = 8cm, BT = 4.8 cm and TD = 5cm.



Find the length of

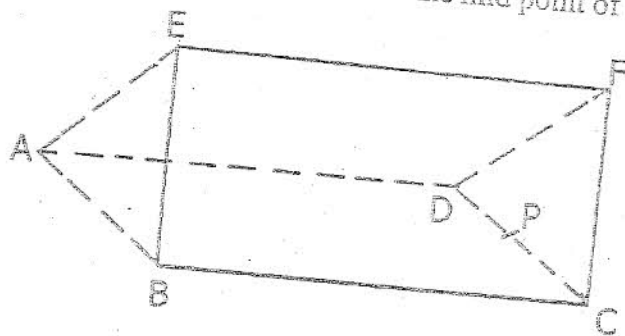
(a) TC

(2mks)

(b) BX

(2mks)

16. The figure below shows the roof of a building with a triangular prism on a rectangular base.  $AB = DC = 8\text{m}$ ,  $AE = BE = 5\text{m}$  and  $BC = 10\text{m}$ .  $P$  is the mid point of  $CD$ .



Find the

- (a) Length of  $BD$ .
- (b) Angle between line  $BF$  and the plane  $ABCD$ .

(1mk)

(2mks)

SECTION II (50 MARKS)

Answer only FIVE questions in this section.

The second, sixth and eighth terms of an arithmetic sequence forms the first three consecutive terms of a geometric sequence.

- (a) Write an expression of  $d$  in terms of  $a$  hence find  $d$  if  $a = -18$ . (4mks)

- (b) Find the first term and the common ratio of the geometric sequence. (2mks)

- (c) Find  
(i) the sum of the first 5 terms of the arithmetic series. (2mks)

- (ii) The sum of the first 3 terms of the Geometric series. (2mks)



18. The table below shows the rates of taxation in a certain year

Income in Ksh p.a	Rate in Ksh per £
1 – 4000	2
4001 – 7500	3
7501 – 11000	4
11001 – 14500	5
14501 – 18000	8
18001 – 21500	9
Over 21500	10

Mr. Nkonge earns a basic salary of Sh 21000, a house allowance of Sh 6,000, a medical allowance of Sh 700 and a hardship allowance of Sh 6,300 per month. He is entitled to a relief of Sh 1,056 per Month.

(a) Calculate

(i) Mr Nkonge's taxable income in Ksh p.a

(2mks)

(ii) His P.A.Y.E

(5mks)

(b) In addition to P.A.Y.E, the following deductions are made from his salary every Month:

Cooperative shares Sh 1000

W.C.P.S 2% of basic salary

Calculate his net pay Month.

(3mks)

- 11 (a) Use the trapezium rule with six trapezia to estimate the area bounded by the curve  $y = 2x^2 + 3x + 1$ , the x-axis and the ordinates  $x = 0$  and  $x = 3$ . (5mks)

- (b) Calculate the exact area in (a) above by integration. (3mks)

- (c) Assuming the area calculated in (a) above is an estimate, Calculate the percentage error made when the trapezium rule is used leaving your answer to 2 decimal places. (2mks)

20. A flower garden is in the shape of a triangle  $ABC$  such that  $AB = 9\text{m}$ ,  $AC = 7.5\text{m}$  and angle  $ACB = 75^\circ$ . Using a ruler and a pair of compasses only.

(a) Construct  $\triangle ABC$

(3mks)

(b) Construct a locus of  $P$  such that  $AP = PC$ .

(2mks)

(c) Construct locus of  $Q$  such that it is equal distance from  $AB$  and  $BC$  and Locus of  $R$  which is  $2\text{m}$  from  $AC$ .

(3mks)

(d) Flowers are to be planted such that they are nearer  $AC$  than  $AB$  and less than  $5\text{m}$  from  $A$ . Shade the portion with flowers.

(2mks)



21. The position of two towns are A ( $60^{\circ}\text{N}$ ,  $29^{\circ}\text{W}$ ) and B ( $60^{\circ}\text{N}$ ,  $43^{\circ}\text{E}$ ). Take  $\pi = \frac{22}{7}$ , radius of earth  $R = 6370\text{km}$
- (a) Find the distance between A and B along the parallel of latitude. (2mks)

- (b) Town C is south of B a distance of  $4004\text{km}$ . Find the position of C. (2mks)

- (c) A military jet left town A at local time 0821hrs to C through B. Its average speed is  $1001\text{ km/hr}$ . It stops at B for 30 min for fuelling. Find the local time of C when jet arrived at C. (3mks)

- (d) Another jet left A towards south to town D, then East to C. Find the distance covered from A to C through D in nautical miles. (3mks)

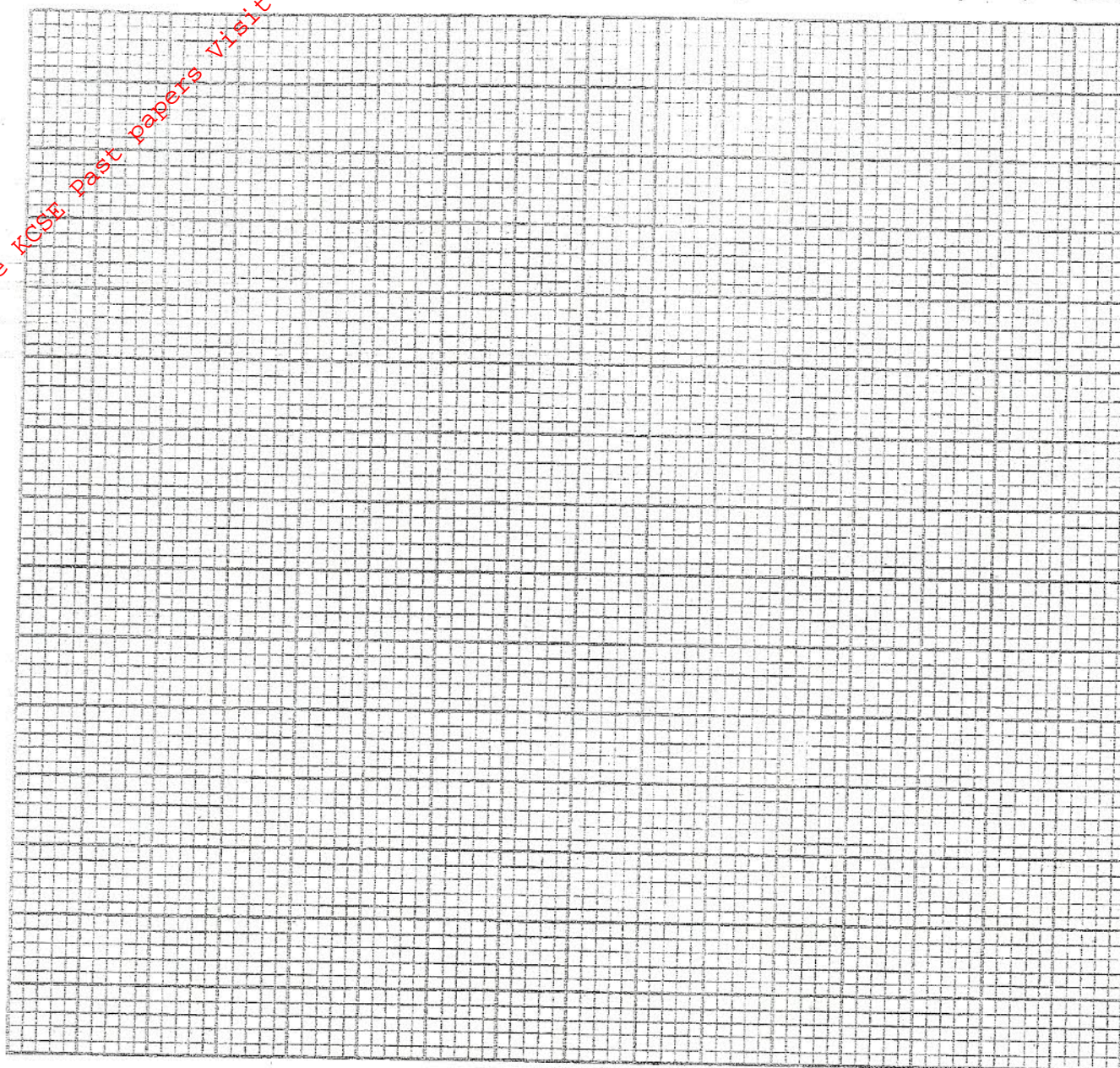


22. Complete the table for the functions  $y = 3 \cos x$  and  $y = \sin 2x$ .

$x$	$-180^\circ$	$-150^\circ$	$-120^\circ$	$-90^\circ$	$-60^\circ$	$-30^\circ$	$0^\circ$	$30^\circ$	$60^\circ$	$90^\circ$	$120^\circ$	$150^\circ$	$180^\circ$
$3 \cos x$	-3	-2.6		0	1.5		3		1.5	0	-0.87	-2.6	-3
$\sin 2x$	0		-0.87	0		-0.87	0	0.87		0	-0.87		0

(b) On the same axis draw the graph of  $y = 3 \cos x$  and  $y = \sin 2x$  for  $-180^\circ \leq x \leq 180^\circ$

(Scale: 1cm represent  $30^\circ$  on the x-axis 1cm represent 0.5 units on y-axis) (4mk)



(c) Use the graph in the (b) above to

(i) Solve the equation  $3 \cos x - \sin 2x = 0$  (1mk)

(ii) Find the range of values of  $x$  such that  $3 \cos x \geq 1.5$  (2mks)

(iii) State the amplitude of  $y = 3 \cos x$  and the period of  $y = \sin 2x$ . (1mk)

23. (a) A die and a coin both fair are tossed together.

(i) List the possible outcomes.

(2mks)

(ii) Find the probability of getting an even number on the die and a tail on the coin or odd number on the die and a head on the coin.

(2mks)

(iii) Find the probability of getting a number greater than 3 on the die and a head on the coin.

(1mk)

(b) The probability that a student gets a grade A in Maths is  $\frac{9}{10}$ . If she gets a grade A in Mathematics then the probability that she gets grade A in Chemistry is  $\frac{4}{5}$ . If she does not get grade A in Maths the probability that she gets grade A in Chemistry is  $\frac{3}{8}$ .

Find;

(i) The probability that she get grade A in Chemistry.

(3mks)

(ii) The probability that she never got a grade A in Chemistry.

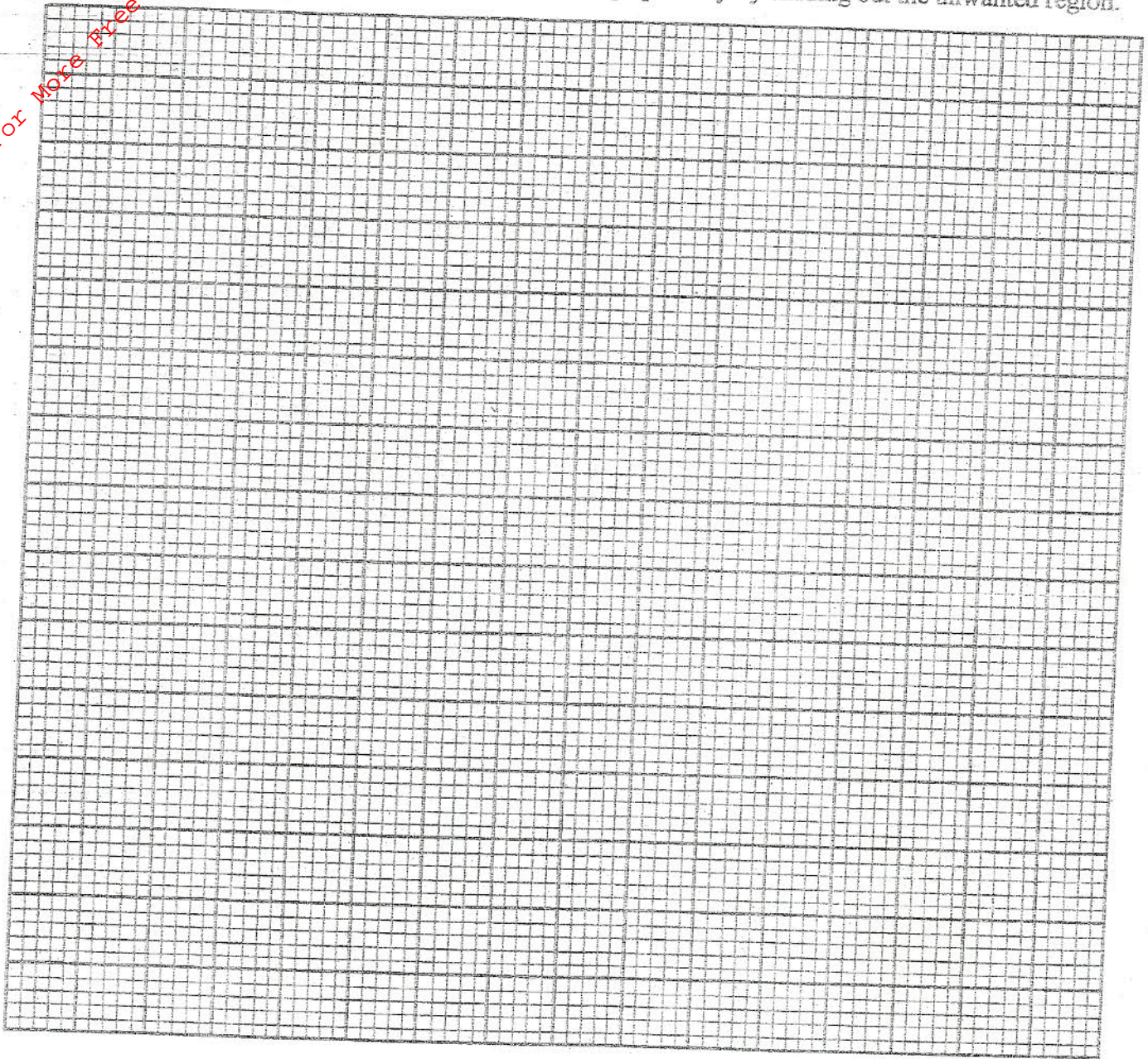
(2mks)



has room to stock 50 items comprising cups and plates every week. He has Sh 6000 to spend on this buying every week. He stocks more than 5 plates and at least 10 cups. By letting the number of cups be  $x$  and number of plates be  $y$ .

(a) Write down all the inequalities representing the above information.

(b) Represent the inequalities in (a) above graphically by shading out the unwanted region.



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- (c) The profit for one cup is Sh 30 and for one plate is Sh 50. Use your graph in (b) above to determine the number of cups and number of plates he should buy in order to make maximum profit and calculate this maximum profit.

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