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

121/2

MATHEMATICS Candidate's Signature.....

Paper 2

MAY- AUGUST 2013 Date.....

2 ½ Hours

Kenya Certificate of Secondary School – Trial Examination

MATHEMATICS

Paper 2

2 ½ Hours

Instructions to Candidates

1. *Write your name and index number in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above.*
3. *This paper consist **TWO** sections: section **I** and section **II**.*
4. *Answer all the questions in section **I** and **five** questions from section **II**.*
5. *All answers and working must be written on the question paper in the spaces provided below each question.*
6. ***Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
7. ***Non-programmable** silent 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 Examiner' use only.

Section I

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

Grand Total

TAP TRIAL 4

This paper consists of 16 printed pages

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SECTION I (50 marks)

*Answer **all** the questions in this section in the space provided.*

1. The sides of a triangle were measured and recorded as 6.4 cm, 9.5cm and 11.3 cm. Calculate the percentage error in perimeter correct to2 dp. (3 marks)

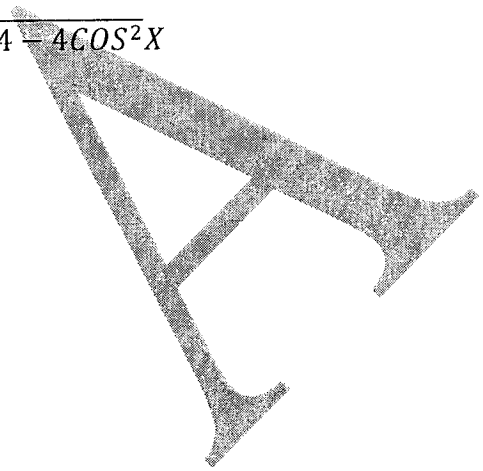
2. Make R the subject of the formular. $A=\pi(R - r)(R + r)$ (3marks)

3. Rationalize the denominator and simplify $\frac{\sqrt{2} + 1}{\sqrt{3} + \sqrt{2}}$ (3marks)

4. The third and the fifth terms of an AP are 10 and -10 respectively.
   (a) Determine the first term and the common difference. (3 marks)

   (b) Find the sum of the first fifteen terms of the AP. (1 mark)

5. Simplify the expression $\sqrt{(4-4COS^2X}$ (3marks)



6. Using a calculator, simplify. (3marks)

$$\frac{1.32X1.62+2.64X1.19}{0.66X7.27-0.66X2.27}$$

7. A man is now three times as old as his daughter. In twelve years' time, he will be twice as old as his daughter. Find their present age. (3 marks)

8. Given that log3= 0.4771 and log 5=0.6990. Evaluate without using tables and calulators.

(i) log 135 (2 marks)

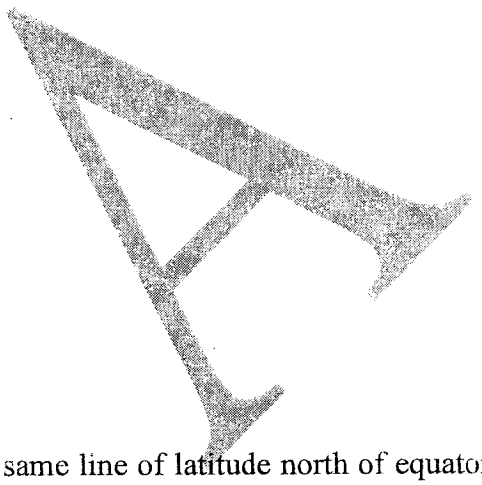
(ii) log 1125 (2 marks)

9. Use log tables to evaluate. (4 marks)

$$\sqrt[4]{\frac{3.521 \times 0.8921}{795.3}}$$

10. Susan deposited sh 35, 400 in a saving account at the beginning of the year. Calculate the compound interest rate per annum if after 3 years the amount in her account was 57, 630.
(3 marks)

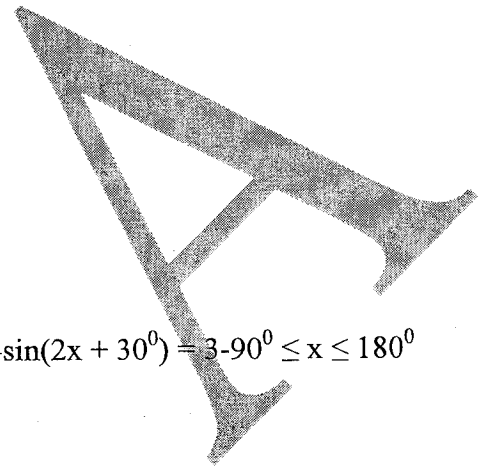
11. A square is mapped onto its image by a transformation T whose matrix is $\begin{pmatrix} 5x & 2 \\ -3x & x \end{pmatrix}$
If the ratio of the area of the square to that of its image is 1 : 11.Find x. (3 marks



12. Two towns A and B are the same line of latitude north of equator. The longitude of A is 118^0w and that of B is 133^0E. The shorter distance between A and B measured along the circle of latitude is 5422 nm. Find to the nearest degree, the latitude on which A and B lie.
(3marks)

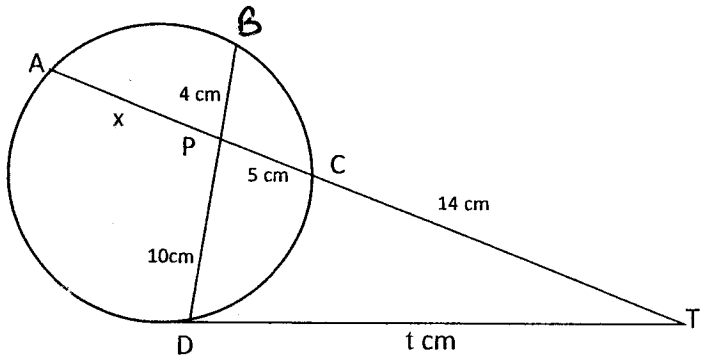
13. The points A (5, 5) and B(-3, -7) are the ends of a diameter of a circle. Find the equation of the circle; writing it in the form $x^2 + y^2 + ax + by + ç = 0$ (3marks)

14. Expand $(\sqrt{3} + 2x)^6$ up to the fourth term (2marks)



15. Solve for x in the equation $4\sin(2x + 30^0) = 3 - 90^0 \leq x \leq 180^0$ (3marks)

16. In the figure below BD and AT are straight lines DT is a tangent at D. AP = x , PC = 5cm , CT = 14cm PD = 10 cm Pb = 4 cm and DT = t. Find the values of x and t (3marks)



SECTION II (50 marks)

*Answer any **five** questions in this section in the space provided.*

17. Two variables, x and y are thought to be connected by a nonlinear law involving two constants. The law is $y = ax^2 + b$. The following values of x and y are known.

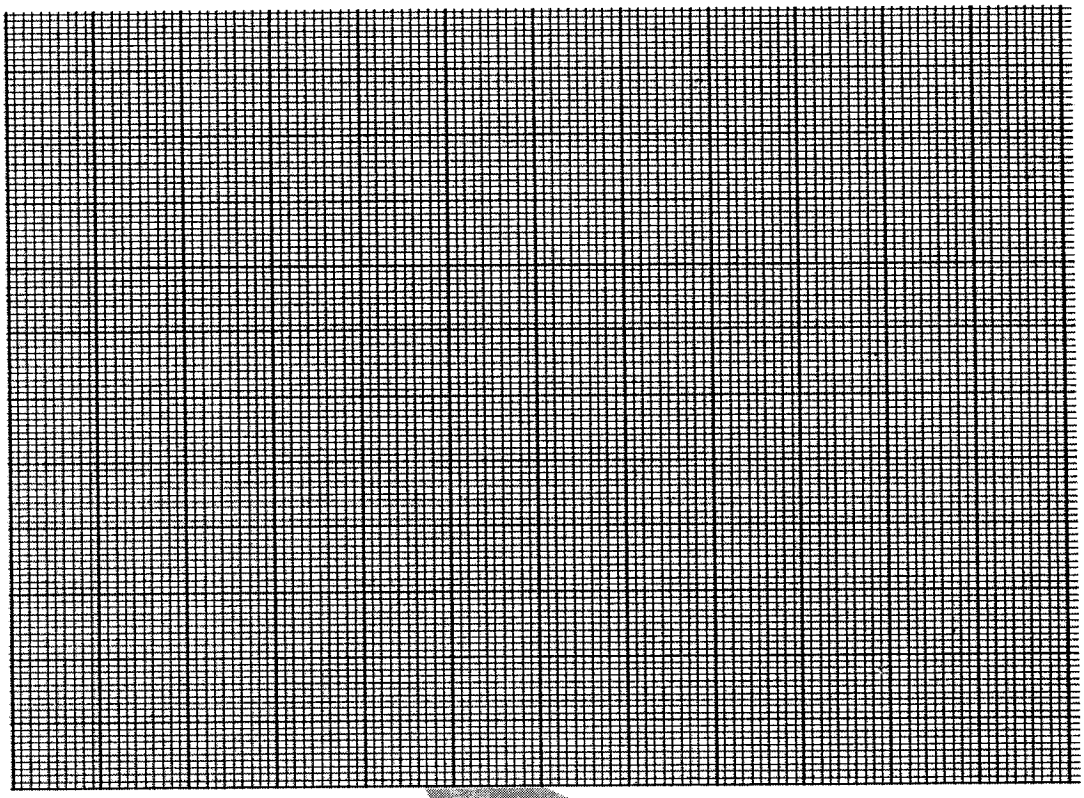
X	0.5	1.0	1.5	2.0	2.5	3.0
Y	-9.5	-8.0	-5.5	-2.0	2.5	8.0

(a) State what to plot on y axis and x axis to get a straight line graph (1mark)

(b) Fill in the table below (2marks)

X^2						
Y	-9.5	-8.0	-5.5	-2.0	2.5	8.0

(c) Use the values above to plot a straight line graph (3marks)



(d) Use your graph to state the value of a and b (3marks)

(e) State the law connecting y and x (1mark)

18. Three people Alex, Ben and Caleb work together to make a certain number of tins. If Caleb was to work alone he would take $4\frac{4}{9}$hours to complete the job. If all are working together they would take 1hr 40 minutes to complete the job. They all started working together however Ben left after the first 40 minutes, while Caleb left 20 minutes later Alex took a further 1hour 46 minutes to complete the remaining work.

Calculate how long it would take if all the tins were made by;

(a) Alex alone (6marks)

(b) Ben alone (2marks)

(c) Alex and Caleb alone (2marks)

19. (a). Using the trapezoidal rule, estimate the area under the curve $y = \frac{1}{2}x^2 - 2$ between $x = 8$ and $x = 2$ and the x axis using 6 trips. (5marks)

(b). (i) Use the integration to evaluate the exact area under the curve. (3 marks)

(ii) Find the percentage error in calculating the area under the curve using the trapezoidal rule. (2 marks)

20. The table below shows the rate at which income tax is charged for all income earned in the year 2007.

Taxable income in K£ per month	Rate in % per K£
1- 236	10%
237- 472	15%
473- 708	20%
709- 944	25%
945- over	30%

A total of Ksh 12000 is deducted from Mr Rono's monthly salary. He is entitled to a house allowance of Ksh 6000 and a personal relief of Ksh 1064 p.m. Every month he pays the following:

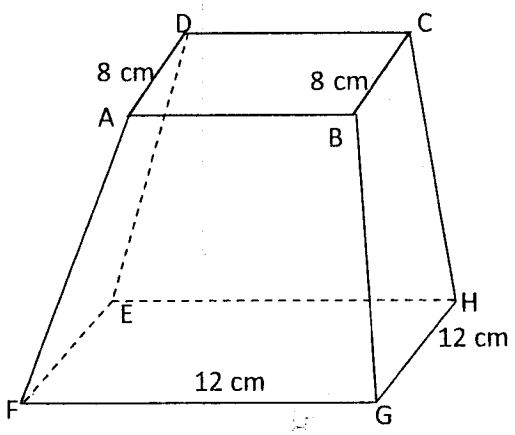
(i) Electricity bills of Ksh 680
(ii)Co-operative shares Ksh 1280
(iii) Water bill Ksh 460
(iv) Loan payment Ksh 5000

(a) Calculate his P.A.Y.E (2marks)

(b) Calculate his monthly taxable income. (6 marks)

(c) Calculate his basic salary per month. (2 marks)

21. The figure below shows a solid frustrum of a pyramid with a square top of side 8 cm and a square base of side 12cm. The slant edge of the frustrum is 9 cm.



(a). Calculate the total surface area of the frustrum (4 marks)

(b) Calculate the volume of the solid frustrum to 1 d.p (4marks)

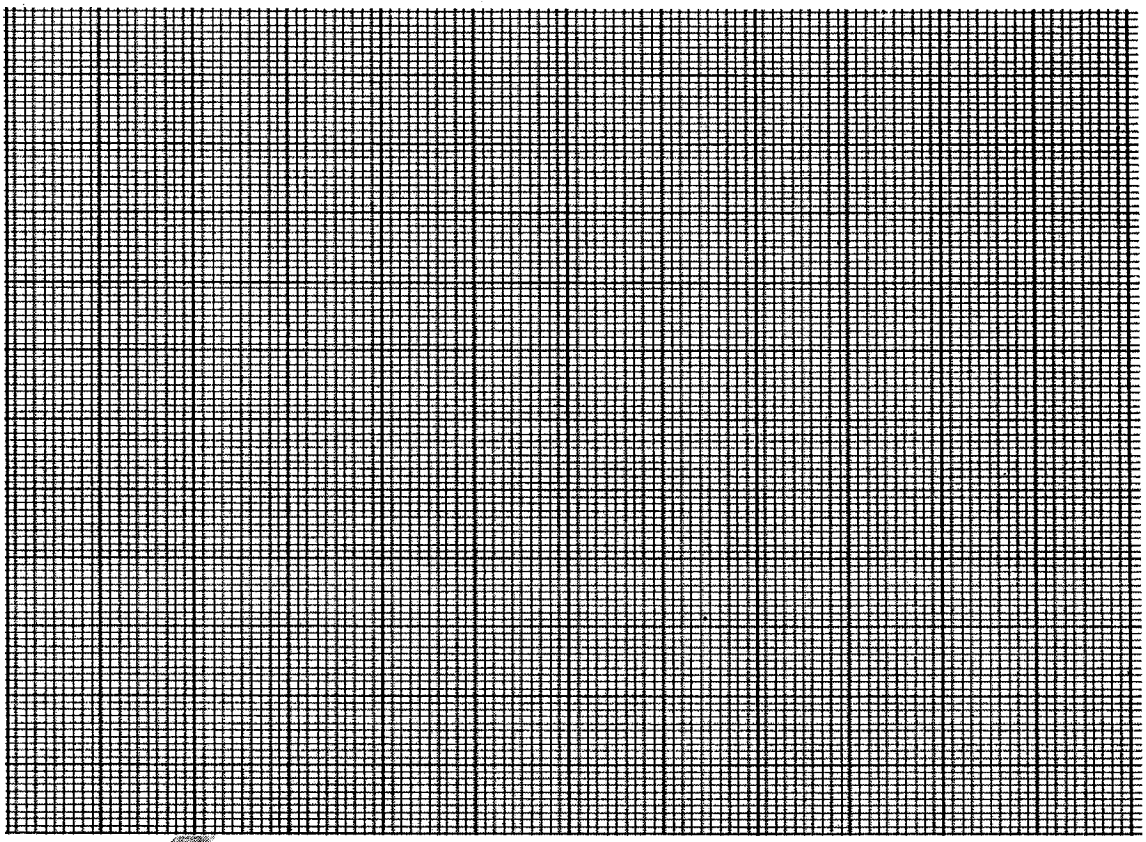
(c) Calculate the angle between the planes BCHG and the base EFGH to 2 d.p.
(2 marks)

22. A tailoring business makes two types of garments A and B. Garment A requires 3 metres of material while garment B requires 2 ½ metres of material. The business uses not more than 600 metres of material daily in making both garments. It must not make more than 100 garments of type A and not less than 80m of type B each day.

Let number of garments of type A be x and type B be y

(i) Write down four inequalities from this information. (3 marks)

(ii) Graph these inequalities. (4marks)



(iii) If the business makes a profit of sh 80 on garment B. How many garments of each type must it make in order to maximize its total profit assuming that all garments made are sold in the same day? (2 marks)

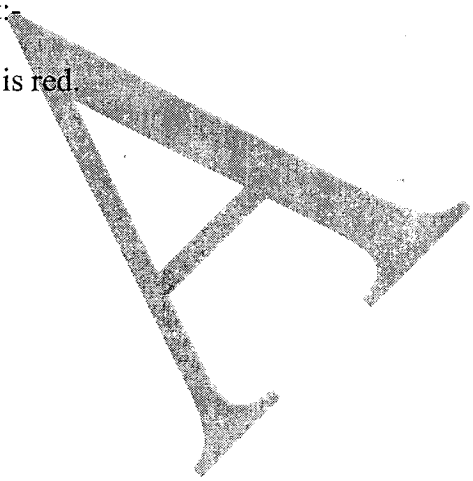
(iv) What is the maximum profit? (1 mark)

23. A bag contains 5 red, 4 white and 3 blue beads. Two beads are selected at random without replacement.

(a). Draw a tree diagram and list the probability space. (3 marks)

(b). Find the probability that:-

(i) The last bead selected is red. (2 marks)



(ii) the beads selected were the same colour. (2 marks)

(iii) At least one of the selected beads is blue. (3 marks)

24. (a). A shear parallel to the x axis maps point (1,2) onto point (7,2). T is the transformation equivalent to this shear followed by reflection in the line y=x. Find the matrix which defines T. (5marks)

(b). Another transformation P maps point (1,3) and (-2,-3) onto points (2,4) and (-3,-11) respectively. Find the matrix of the transformation. (5marks)

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