Name: …………………………………………………… **Index no** ……..............................

School: ……………………………………….......… **Candidate's sign** ……………………....

Date: …………………………………………………………

121/2
MATHEMATICS
PAPER 2
JULY/AUGUST 2011
TIME: 2½ HOURS

RACHUONYO SOUTH DISTRICT JOINT EVALUATION TEST

Kenya Certificate of Secondary Education (K.C.S.E.)

Mathematics
Paper 2

INSTRUCTIONS TO CANDIDATES:

- *Write your **name** ,**index numbe**r , **Signature** and write date of examination in the spaces provided*
- *The paper contains **two** sections. Section **I** and Section **II.***
- *Answer **all** the questions in section I and any **five** questions in section **II.***
- *Answers and working **must** be written on the question paper in the spaces provided below each question.*
- *Marks may be given for correct working even if the answer is wrong.*
- *Non programmable silent electronic calculators and KNEC mathematical table may be used, except where stated otherwise.*

FOR EXAMINERS USE ONLY

SECTION 1

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									

TOTAL MARKS

This paper consists of 12 printed pages. Candidates should check to ascertain that all papers are printed as indicated and that no questions are missing.

SECTION I (50 marks)
Answer all questions from this section.

1. Use logarithm tables to evaluate correct to 4 decimal place (3mks)

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

2. Solve $2x^2 - 7x = -5$ by completing the square method. (2mks)

3. The gradient of a curve at any point s given by $2x - 1$. Given that the curve passes through point (1,5). Find the equation of the curve. (3mks)

4.   The position vector of A and B are $\begin{pmatrix} 3 \\ -1 \\ -4 \end{pmatrix}$ and $\begin{pmatrix} -7 \\ 9 \\ -24 \end{pmatrix}$ respectively. P divides AB in the ratio 2:-3.   (3mks)

      Find the position vector point B.

5.   Given that $\cos x = \dfrac{2}{\sqrt{5}}$. without using tables or calculators, evaluate and Simplify leaving your answer in the form of $a\sqrt{b}$.
      (a) Sin x   (2mks)

      (b) tan (90-x)   (2mks)

6.   (a) Expand $(a - b)^5$ (1mk)

(b) Use the first four terms of the expansion in (a) above to find the approximate value of $(1.98)^5$ correct to 4 s.f (3mks)

7. The points with coordantes (5,5) and (-3,7) are the ends of a diameter of a circle centre A.
(i) Determine the coordinates of the circle centre A. (1mk)

(ii) Determine the equation of the circle in the from $x^2+y^2+ax + by + c = 0$ where a, b, and c are constants . (2mks)

8. Simplify $\dfrac{1+ \sqrt{5}}{2 +\sqrt{5}} - \dfrac{1- \sqrt{5}}{2-\sqrt{5}}$ leaving your answer in the form $a\sqrt{b}$ (3mks)

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9.   Make P the subject of the formular.   (3mks)

$$M = \left(\frac{Px}{Mx-P}\right)^{1/5}$$

10.   (a) Find the value of K for which $\begin{pmatrix} K+1 & 2 \\ 4K & 2K \end{pmatrix}$ is a singular matrix.   (2mks)

(b) If $A = \begin{pmatrix} 0 & 3 \\ 3 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 0 \\ 2 & -4 \end{pmatrix}$, find the value of X if $3X - 2A = 3B$ (2mks)

11.   By correcting each number to 1 significant figure, approximate the value of 788 X 0.006. Hence
calculate the percentage error arising from this approximation.   (3mks)

12. Determine the quartile deviation of the following data. (2mks)

4 , 9 , 5 , 4 , 7 , 6 , 2 , 1 , 6 , 7 , 8 , 3

13. Type A rice costs Shs. 70 per Kg while type B rice costs 84 per kg. A shopkeeper mixes the two brands of rice in the ratio 4:3 respectively. At what price must he sell the mixture to make a profit of 26% per kg (3mks)

14. Solve the equation 4- 4 Cos^2 x = 4 Sin x for $0^c \le x \le 2\pi^c$ (leave your answer in terms of π) (3mks)

15. In the figure below, AB is a diameter of a circle. Chord PQ intersects AB at N. A tangent to the circle at B meets PQ produced at R.(The figere not drawn to scale)
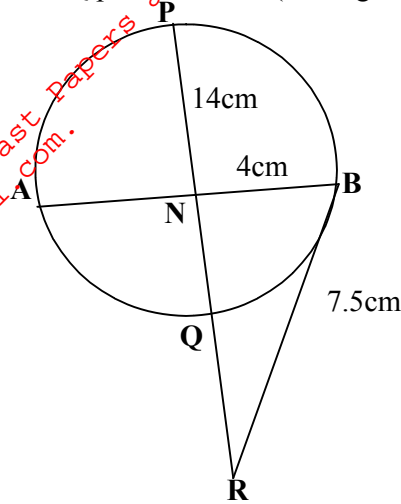
Given that PN = 14cm, NB = 4cm and BR = 7.5cm Calculate the length of

   (a) NR   (1mk)

   (b) AN   (2mks)

16. A particle moves in a straight line from a fixed point O. its velocity V m/s after t seconds is given by $V=(9t^2-4t-1)$m/s. Calculate the distance travelled by the particle during the third second   (3mks)

17. Income tax for all income earned was charged at the Rate shown below.

Total income per year in £ (p.a)	Rate in shs. Per £
1- 1980	2
1981 – 3960	3
3961 - 5940	5
5941 - 7920	7
7921 -9900	9
9901 and above	10

Karuiki paid a net income tax per month of Ksh. 1755. He was given a house allowance of Kshs. 2500 P.M and got a family relief of shs. 200 P.M Calculate his Basic salary per month. (giving your answer to the nearest shs.)   (10mks)

18. A triangle T whose vertices are A (2,3), B (5,3) and C (4,1) is mapped onto triangle T whose vertices are A^1_1 (-4,3), B^1_1 (-1,3) and C^1_1 (x, y) by transformation

$$M = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

(a) Find the
(i) Matrix M of transformation. (4mks)

(ii) Find the coordinates of C_1 (2mks)

(b) Triangle T_2 is the image of triangle T_1 under a reflection in the line y = x. Find single matrix that maps T onto T_2. (2mks)

(c) Find the coordinates of T_2 and hence plot it on the grid provided. (2mks)

19. Use a ruler and a pair of compasses only for all the constructions in this question.
(a) Construct triangle ABC such that BC = 6cm, angle ABC = 30o and line BA = 12 cm. (4mks)

B _____ C
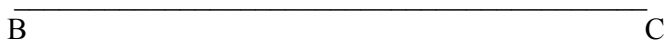
(b) Construct perpendicular from A to meet BC produced at D. Measure CD. (2mks)
(c) Construct triangle BPC such that the area of triangle BPC is three quarters of the area
of triangle ABC and on the same side of BC as triangle ABC. (3mks)
(d) Describe the locus of P (1mk)

20. (a) Complete the table for the equation $y = x^3 + 2x^2$ (2mks)

x	-3	-2.5	-2	-1.5	-1	-0.5	0	0.5	1	1.5
x^3	-27		-8	-3.375	-1	-	0	0.125	-	3.375
$2x^3$	18	-	8	4.5	2	-	0	0.5	-	4.5
y	-9	-	0	1.125	1	-	0	0.625	-	7.875

(b) On the grid provided, draw the graph of $y = x^3 + 2x^2$ for $-3 \le x \le 1.5$
Take the scale 2cm for 1 unit on the x-axis and 1 cm for 1 unit on the y-axis. (3mks)
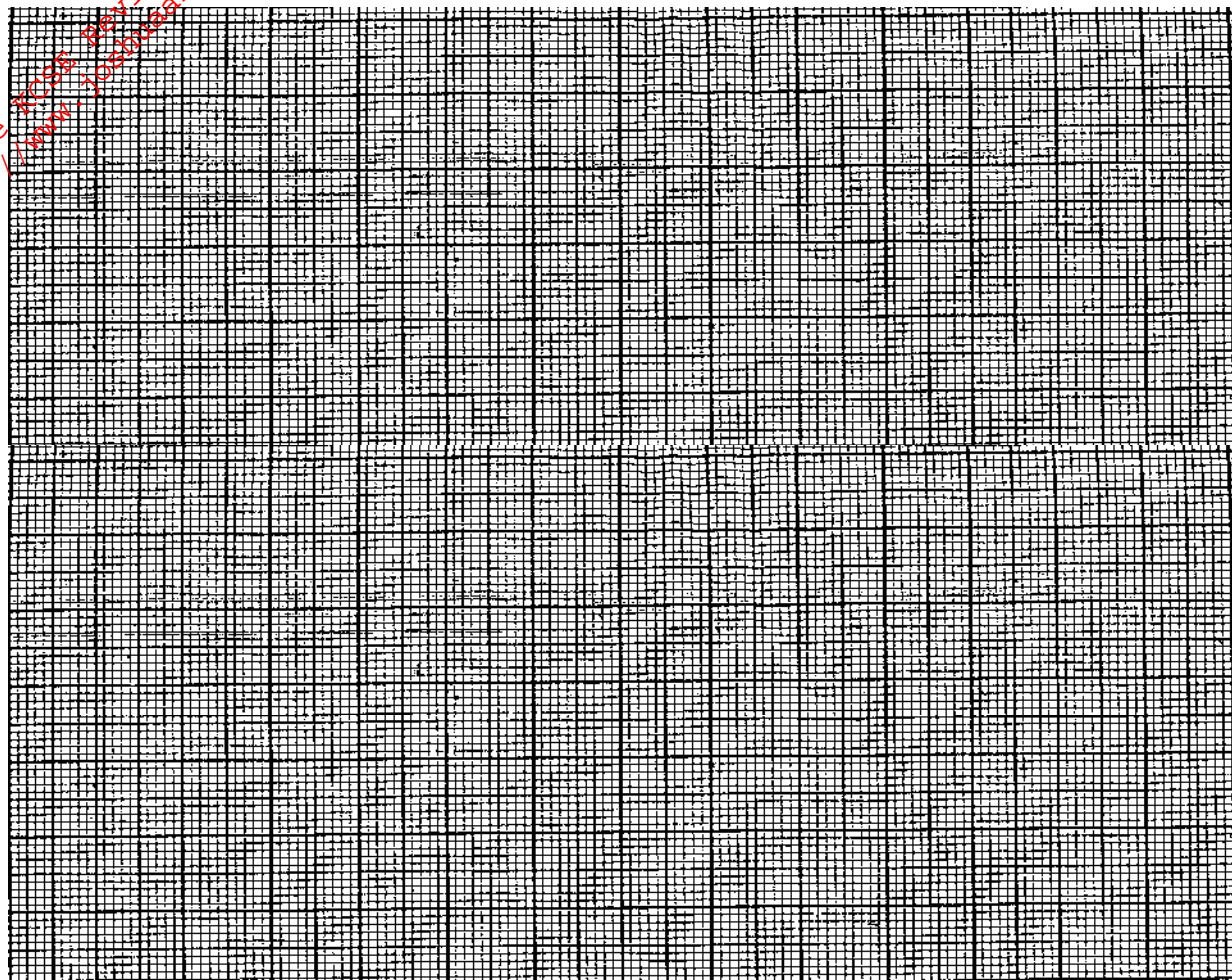
(c) (i) Solve the equation $x^3 + 2x^2 = 0$ (2mks)

(ii) Solve the equation $x^3 + 2x^2 - x - 2 = 0$ using your graph and another line graph.
(3mks)

21. The probability of three darts players Edmond, Stephen and Fredrick hitting a bulls eye are 0.2, 0.3 and 0.15 respectively.

(a) Draw a probability tree diagram to show the possible outcomes. (2mks)

(b) Find the probability that

 (i) All hit the bull's eye (2mks)

(ii)None hits the bull's eye. (2mks)

(iii) Only one of them hits the bull's eye. (2mks)

(iv)Atmost one misses the bull's eye (2mks)

22. The table below shows the distribution of marks scored by sixty pupils in a test.

Marks	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90
Freq	2	5	6	10	14	11	9	3

(a) On the grid provided, draw an orgive curve that represents the above information (4mks)
  (Use the scale: 1 cm to 5 units on both x-and y –axis)

(b) Use the curve to estimate the quartile deviation of the data. (3mks)

(c) In order to pass the test a pupil has to score more than 48 marks. Calculate the percentage of pupils who passed this test. (3mks)
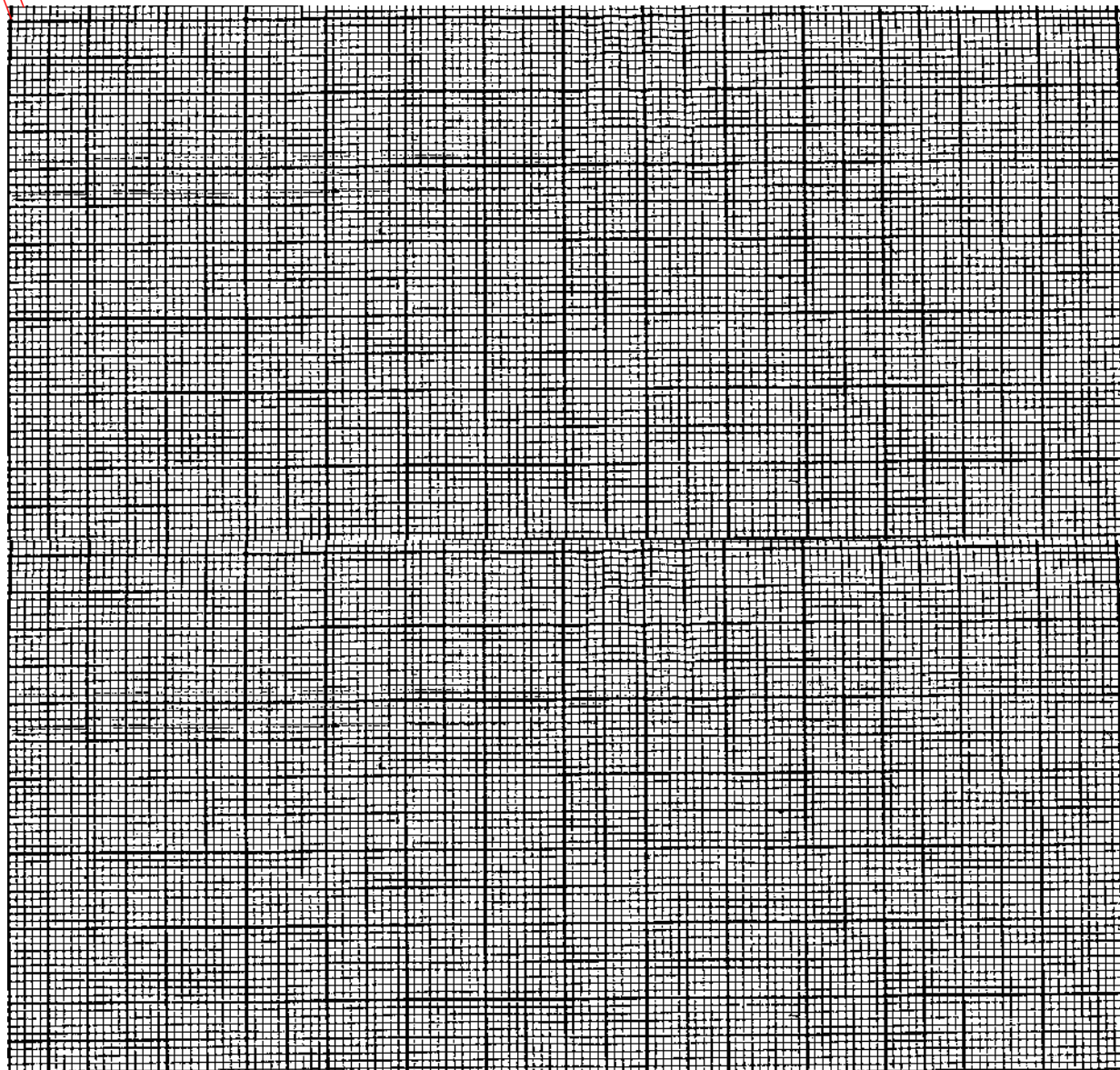
23. (a) Sketch the curve $y = x^2 - 7x + 10$ for $0 \leq x \leq 6$. on the grid provided. (4mks)
    (use the scale H.S 1 cm for 1 unit and V.S 1 cm for 2 units)
    (b) Using your sketch calculate the area between curve and the x-axis between x= 2 and
    x=5 using trapezoidal rule. (take each width to be 0.5 units) (3mks)
    (c) Calculate the exact area bounded by the curve and the line y=o and state the error in
    calculating the two areas. (3mks)

24. The position of two cities A and B are A (30°S, 60°W) B (30°S, 25°W). Find to the nearest Km
   (a) (i) the distance between A and B along parallel of latitude. (4mks)

   (ii) The distance between A and B in nautical miles. (2mks)

   (b) A city C is 3000km due north of B, find the latitude of C (4mks)
      (take the radius of the earth to be R=6370km and $\pi = \frac{22}{7}$)