NAME ..... INDEX NUMBER .....

Adm ..... SIGNATURE .....

School ..... DATE .....

121/2
MATHEMATICS
PAPER 2
TIME: 2½ HRS
JULY/AUGUST 2016

KERICHO WEST JOINT EVALUATION EXAMINATION

KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)

Paper 2
July/August 2016
Time: 2½ hours

INSTRUCTIONS TO CANDIDATES

a) Write your name, Adm number, index number and Class.
b) This paper consists of **two** sections: Section **I** and section **II**
c) Answer **all** questions in Section I and only **five** questions in Section II.
d) Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
e) Marks may be awarded for correct working even if the answer is wrong.
f) Negligence and slovenly work will be penalized.
g) Non programmable silent electronic calculators and K.N.E.C Mathematical tables are allowed for use.
h) This paper consists of **15** printed pages.
i) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
j) Candidates should answer the questions in English.

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

SECTION 1 (50MARKS)

Answer ALL the questions in this section in the spaces provided

1. Given that log 2=0.3010, log 3 = 0.4771 and log 7= 0.8451 .Without using mathematical table or a Calculator evaluate log 21.168. (3marks)

2. Make x the subject of the formula. (3marks)

$$P = \frac{bx}{\sqrt{ax2 + b}}$$

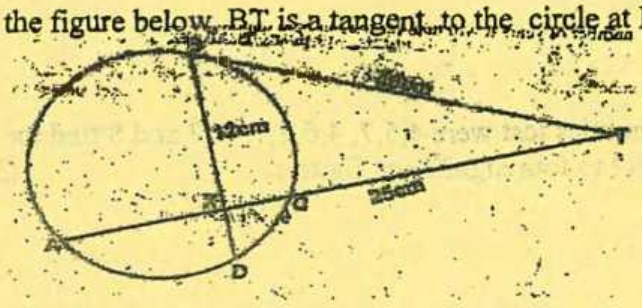
3. The internal and external radii of a hollow cylinder is estimated to be 12cm and 16cm respectively, to the nearest whole number. The height of the cylinder is exactly 28cm, calculate the maximum possible volume of the materials used. (3marks)

4. The cost of a bus in January 2002 was 2002 was Ksh 852000. it depreciated in value by 10% per year. Calculate the number of years it will take for the value to depreciate to Ksh 5, 03397.25 (3marks)

5. if OA = 12i +8j -3k and OB = 162i + 4j +5 k .find the magnitude of OP if P Divides AB in the ratio of 1:3 (3marks)

6A machine starts production of sweets at a rate of 1,200, 000 per hour. The rate of production decrease by 20% every hour. Calculate the time it would take to produce a total of 4,427,136 sweets (3marks)

7. in the figure below, BT is a tangent to the circle at B . AXCT and BXD are straight lines intersecting



Given that BT = 40cm, CT =25cm, Bx =12 X divide AC in the ration 2: 1 Calculate
a) the length AX (2marks)

b) The length DX correct to one significant figure. (2marks)

8. Without using a mathematical table or a calculator simplify: $\frac{\text{Cos } 150,}{\tan 225 + \sin 60}$ leaving the answer In the form a+b √c, where a, b and c are integers. (3marks)

9. Three quantities P,X and Y are such that P varies directly as the square of X and the square root of Y if X is increased by 5% and Y is decreased by 36 , Find the percentage change in P. (3marks)

10. Use binomial expansion to evaluate; (3marks)
$(3+\sqrt{2})^4+(3-\sqrt{2})^4$

11. Aman walk s 10km on a bearing of 300^0 from a point A and then walks due south to a point B which is 15km from A. calculate the bearing of B from A correct to three significant figures (3marks)

12. A transformation is represented by the matrix $\begin{pmatrix} -2 & 3 \\ 5 & -4 \end{pmatrix}$ .This transformation maps s triangle ABC Onto another triangle $A^1B^1C^1$ of the areas 399cm2. Find the area of triangle ABC (3marks)

13.find a quadratic equation whose roots are 2.5 and -1.5 expressing it in the form ax2 +bx +c= 0, where a, b and c are integers.

14. The mark s obtained by 10pupils in a mathematics test were 4,5,7, 4,6,2,1, 6, 7 and 8 find the value of the standard deviation of the marks correct to four significant figures. (3marks)

15. Solve the equation $4\sin 2X^\circ = 5-4\cos X^\circ$ for $-180^0 \leq X \leq 180^0$ .Give the answer in degrees (4marks)

16. Two grade of tea leaves A and B costs Ksh 120 and Kshs 150 respectively .A and B are mixed in the ratio 3: X if the selling price gives a profit 20% when sold at 158. 40 per kilogram find"
a) the cost price (1mark)

b) The value of X (2marks)

SECTION II (50MARKS)
Answer only FIVE questions from this section in the spaces provided

17. The table below shows income tax rate for a certain year.

Monthl icome in Ken a shillin s hs	Tax Rate in each shillin
Under 10165	10%
From 10165 but under 19741	15%
From 19741 but under 29317	20%
From29317 but under 38893	25%
From 38893 and over	30%

Mary earns monthly basic salary of Kshs 34, 500 , house allowance of kshs 12, 000 Medical allowance of Kshs 2800 and transport allowance of Ksh 2,480.

a) Calculate her monthly taxable income. (1mark)

b) Mary is entitled to a personal relief of Ksh 1162, per month. Determine the net tax. (6marks)

c) if Mary received a 5% increase in his total income calculate the corresponding percentage increase on her income tax, correct to two significant figures. (3marks)

18.a) using ruler and compasses only , Construct a triangular plot of land ABC such that AB = 320m, AC = 280 and angle BAC =671/2 .Use the scale 1cm to represent 40m. (4marks)

b) A farm P is equidistant from BA and BC and lies on the perpendicular from C to AB. Locate the Position of P. (3marks)

c) Find a point on this which is furthest to the farm house p and find its distance (3marks)

19. Two towns P and Q lie on the same latitude in the Southern hemisphere when its 10.30 am at P, the time at Q is 1.30pm.

a) Given that the longitude of P is 250E, find the longitude of Q (3marks)

b) a plane leaves P for Q and takes 31/2 hours to arrive at Q traveling along a parallel of latitude at 850km. find

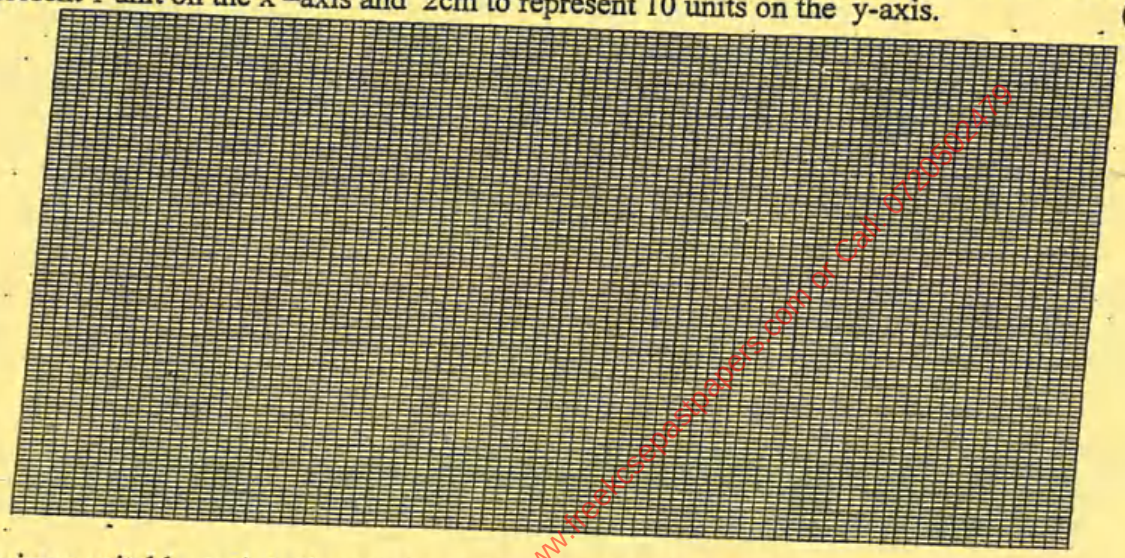
i) the radius of the circle of latitude on which towns P and Q lies correct to four signification figures Take $\pi = 22/7$ and radius of the earth R= 6370km. (4marks)

ii) the position of the towns Q. (3marks)

20. a) Complete the table below for the function $Y = 2x^3 + x^2 - 5x + 2$ (2marks)

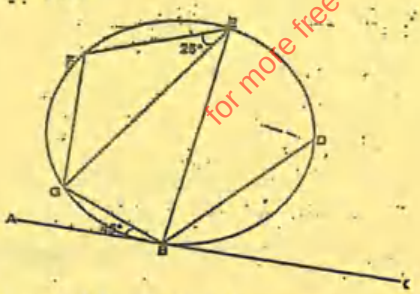
X	-3	-2.5	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2	2.5	3
$2x^3$	-54	- 31.25	-16	- 16.75		- 0.25	0	0.25		6.75		31.25	54
X^2		9.25		2.25	1	0.25	0	0.25		2.25		6.25	9
$-5x^2$		12.5		7.5		2.5	0	-2.5	-5	-7.5		-12.5	-15
2	2	2	2	2	2	2	2	2	2	2	2	2	2
y		-10.5		5.5		4.5	2	0		3.5		27	50

b) On the grid provided draw the graph of the function $y = 2x2 + x2 - 5x + 5x + 2$ for $-3 \leq x\ 3$. Use 2cm to represent 1 unit on the x –axis and 2cm to represent 10 units on the y-axis. (3marks)



c) By drawing a suitable straight line on the sane grid as (b) above, solve the equation $2x3 + x2 - 8x - 4 = 0$ (5marks)

21. In the figure below, ABC is the tangent to the circle at B . Angle ABG = 450 , angle FEG = 25^0 and angle BDE = 100^0



find the values of the following angles , stating reason in each case.

a) i) <BFG (2marks)

ii) < BGF (2marks)

iii) <BDF

(2marks)

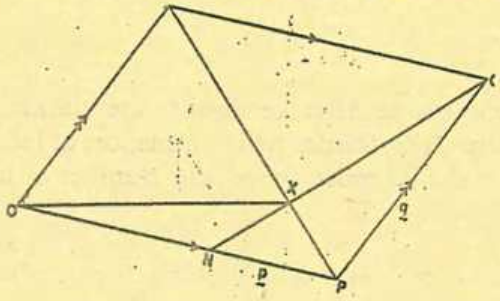
b) If BE bisects angle GED, find:
i) <DBC

(2marks)

ii) < GBE

(2marks)

22. In the diagram below OPQR is a parallelogram OP= P and PQ = q .N is appoint on OP such that ON: NP = 2:3



a) Find
i) PR in terms of P and q

(1marks)

ii) QN in terms of P and q

(1mark)

b) The line PR and QN intersects at X , PX = hPR and QX = KQN . (6marks)
i) By expressing OX in two ways find the values of h and K .

ii) Find the ratio PR: RX

(2marks)

23. In a medical research station a new vaccine drug for AIDS is being tried. A sample of 36 people was diagnosed to be HIV positive. Twenty patients were vaccinated with the vaccine and the rest were not.

a) Calculate the probability that a patient picked at random is
i) Vaccinated with the vaccine.

(1mark)

ii) Not vaccinated with the vaccinated with the vaccine.

(1mark)

b) if the patient is vaccinated the probability of dying in in two years time is 1/6 while if not vaccinated the probability is 2/3 calculate the probability that a patient picked at rand from the 36 people is ;

i) Vaccinated with the drug and will die.

(2marks)

ii) Not vaccinated with the drug and will die. (2marks)

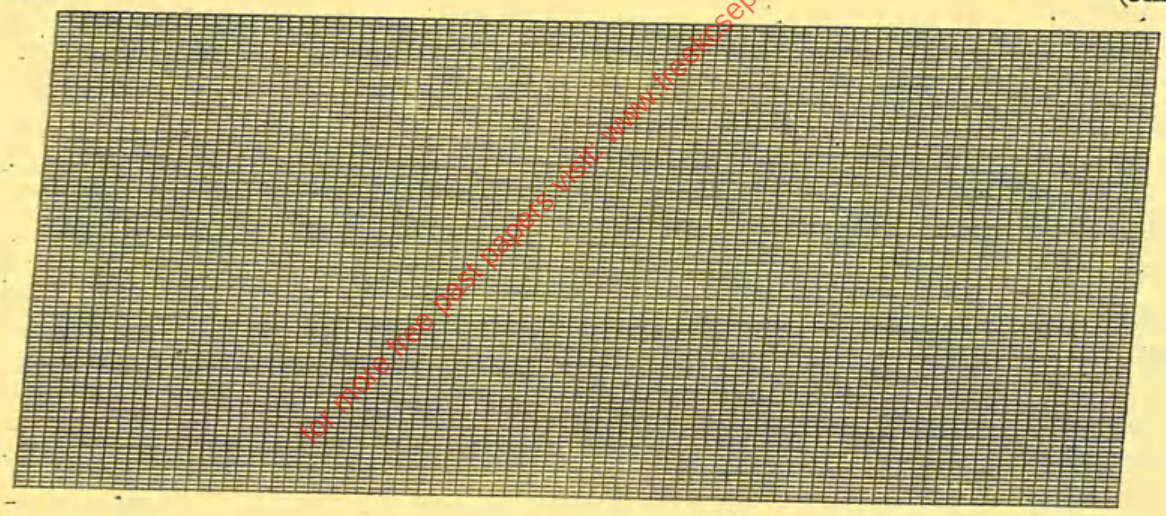
iii) Not vaccinated with the drug and will not die. (2marks)

iv) The patient will not die. (2marks)

24. A farmer has a pick –up and a truck to transport maize from the farm to the market. A pick –up carries 20 bags while a truck carries 30 bags per trip . The farmer has to transport at least 1200 bags . He has to make not more than 50 trips .a truck is to make at most twice the number of trips made by the pick –up .

a) By taking X to be the number of trips made by a pick –up and Y to be the number of trips made by a truck , write down three inequalities to represent the information above. (3 marks)

b) On the grid provided , draw the graphs to show the inequalities in (a) above and shade the unwanted regions. (3marks)



c. if trip of a pick-up cost Kshs 2500 and a trip of truck cost Kshs 3000, Use the graph to determine the lowest cost of transporting maize to the market. (4marks)