Name…… Index No. …….

School ……...

121/2
MATHEMATICS
PAPER 2
JULY / AUGUST
2 ½ HOURS

BUTERE-MUMIAS DISTRICT MOCK EXAMINATION-2007

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

121/2
MATHEMATICS
PAPER 2
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INSTRUCTIONS TO CANDIDATES

1. Write your NAME and INDEX NUMBER in the spaces provided at the top of this page
2. Answer all questions in section I and any five questions in section II.
3. Show all the steps in your calculations giving your answer at each stage in the spaces below each question
4. Marks may be given for correct working even if the answer is wrong.
5. Non-programmable silent electronic calculators and KNEC Mathematical tables may be used.

Section I **FOR EXAMINER'S USE ONLY**

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

This paper consists of 16 printed pages.
Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing

SECTION 1 (50 MARKS)

Answer all the questions in the spaces provided after each.

1. Use log tables only to evaluate to 4 d.p (4mks)

$$\sqrt[3]{\frac{41.07 \times 0.03142}{0.0156 \times 5.8941}}$$

2. Make A the subject of the formula. (3mks)

$$t = \frac{2m}{n}\sqrt{\frac{L - A}{3k}}$$

3. A student expands $(x - y)^2$ as $x^2 - y^2$ if the student uses the expansion to evaluate $(12 - 9)^2$.
Find the % error in his calculation. (3mks)

4. Given $V = \sqrt{5} + \sqrt{2}$ and $U = \sqrt{2} - \sqrt{5}$, Find the value of $\frac{V^2 - u^2}{u^2}$ in the form $a + b\sqrt{c}$. (3mks)

5. Find the centre and radius of a circle whose equation is $3x^2 + 3y^2 - 18x + 12y - 9=0$.
(3mks)

6. a) Expand $(a - b)^6$

b) Use the first three terms of the expansion to find the approximate value of $(1.98)^6$ (4mks)

7. A quantity Q partly varies as R and partly varies as the square of R. When R=2, Q =2 and when Q = 12, R=3, Find Q when R is 5. (4mks)

8. Solve for x if $3 \log x + (\log x)^2 - 10 = 0$. (3mks)

9. Solve the equation $\frac{3}{\sin x} + \frac{1}{\cos x} = 0$ for $O^0 \leq x \leq 360^0$ (3mks)

10. An investor deposited Ksh.40,000 in a bank compounded at the rate of R p.a semi-annually for 2 years, and realized Ksh. 50,499. Find the rate of compound interest. (4mks)
(Give your answer correct to 4.s.f)

11. Given that matrix $M = \begin{pmatrix} x - 5 & 3 \\ -2 & x \end{pmatrix}$ is a singular matrix. Calculate the value of x. (3mks)

12. Find the equation of the normal to the curve $y=2x^2 - 3x + 6$ at the point (2,10). (3mks)

13. Calculate the standard deviation for the following set of data (use actual mean)

9, 12, 13, 15, 16, 19. (4mks)

14. A particle moves such that its distance S obeys the law $S=2t^2 + 5$ where t is time in seconds. Calculate the distance between t=1 and t=5 by mid-ordinate rule. (4mks)

15. From the window a few metres from the ground an observer sees the top of a flag post through angle of elevation 30^0. From the top of the flag post an eagle observes the foot of the building at the point where the window is through an angle of depression 80^0. If the distance from the building to the flag post is 25m. Find the distance from the foot of the building to the window. (4mks)

16. Determine the cordinates of the turning point and state its nature from the curve $y=9+3x-2x^2$.

(3mks)

SECTION II (50 MARKS)

Answer all the questions in the spaces provided after each.

17. Wanjiku earned a monthly salary of sh. 6000. She also received a house allowance of sh. 3000 and a medical allowance of Sh.900. She is entitled to a personal relief of sh. 1056 per month. Income tax charges table is shown below.

Ksh. Per month		Tax rate (%)
1 – 2,500	-	10%
2501 - 4500	-	15%
4501- 6500	-	20%
6501-9000	-	25%
9,001 and above	-	30%

a) How much tax does she pay per month. (7mks)

b) Calculate Wanjiku's net salary for each month if the following deductions are also made monthly

NHIF ksh. 230.

Service charge Ksh. 100 (3mks)

18. The table below represents the marks scored by 200 students in a Mathematics test.

Mark	Frequency
0 -9	2
10 -19	4
20 – 29	11
30 – 39	25
40 – 49	45
50 – 59	50
60 – 69	30
70 – 79	28
80 – 89	4
90 – 99	1

a) Draw a cumulative frequency graph to represent this data. (3mks)

b) From the graph estimate the

(i) median mark (1mk)

(ii) Quartile deviation (2mks)

(iii) Pass mark if $^{7}/_{10}$ of the students failed (2mks)

(iv) Increase in the number of students who would have passed if the pass mark was reduced by 20%. (2mks)

19. a) Complete the table below for the functions of $y=3\sin(2x+30^0)$ and $y=\cos(x-60^0)$ for $O^0 \leq x \leq 360^0$. (2mks)

X	O^o		60^0	90^0	120^0	150^0	180^0	210^0	240^0	270^0	300^0	330^0	360^0
$3\sin(2x+30^0)$	1.50	3.00	1.50		-3.00	-1.50		3.00		-1.50	-3.00		1.50
$\cos(x-60^0)$	0.50		1.00	0.87	0.5	0.00		-0.87	-1.00	-0.87	-0.50	0.00	0.50

Plot the graph of the two functions on the same axes. (5mks)

c) Use your graphs to solve the following

(i) $3\sin(2x+30^0)=0.8$ (1mk)

(ii) $3\sin(2x+30^0)-\cos(x-60^0)=0$ (1mk)

d) Determine the periodic angle of the function $y=3\sin(2x+30^0)$ (1mk)

20. The velocity of a particle moving in a straight line after **t** seconds is given by $v = 4 + 8t - t^2$ m/s.

Calculate

a) The acceleration of the particle after 3 seconds. (2mks)

b) The distance covered by the particle between t=2 sec and t= 6 seconds. (4mks)

c) The time when the particle is momentarily at rest. (4mks)

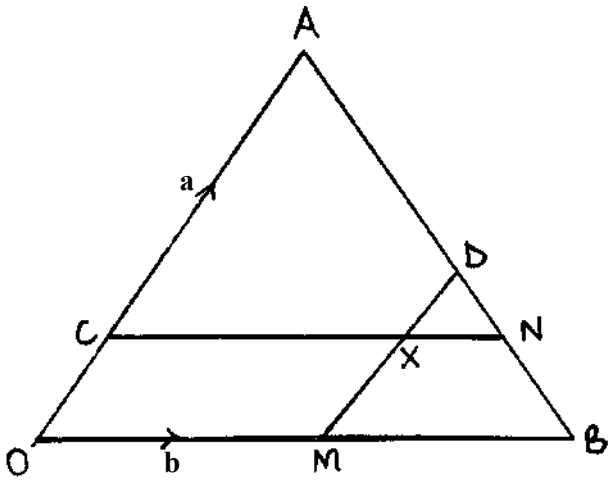
21. Town X is east of town Y where town Y is (15^0N, 3^0W). The local time on X is 2.00p.m. when one local time on Y is 4.00p.m.

a) Find the position of town X. (4mks)

b) The distance between X and Y in nautical miles. (2mks)

c) A plane leaves town X and Y taking the shortest route a parallel of latitudes. It then flies from Southwards to Z. Find the position of Z if XY = YZ. (4mks)

22. In the figure below OA = **a** and OB = **b**. M and N are midpoints of OB and AB respectively. C divides OA in the ratio 1:5 while D divides AN in the ratio 3:2.



a) Express in terms of **a** and **b**.

(i) CN (2mks)

(ii) MD. (2mks)

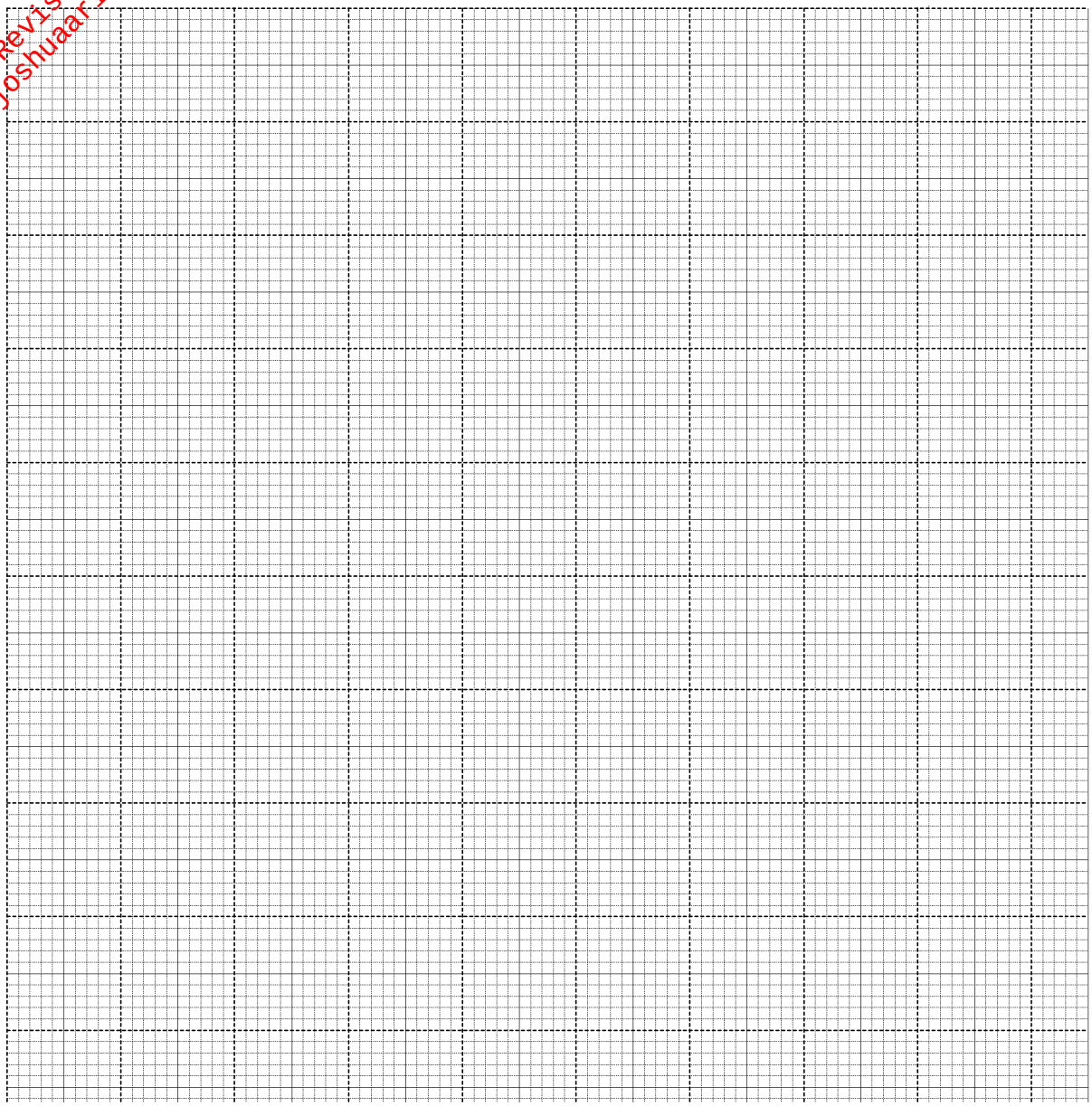
b) If OX = OC + SCN and OX = OM + tmD. Find the values of S and t. (5mks)

c) Find the ratio in which x divides MD. (1mk)

23. In a certain mathematical relationship, The values of A and B are observed to satisfy the relationship $B=CA+KA^2$ where C and K are constants. Below is a table of values of A and B.

A	1	2	3	4	5	6
B	3.2	6.75	10.8	15.1	20	25.2

By drawing a suitable straight line graph, determine the values of C and K. (8mks)



b) Hence write the relationship between A and B. (1mk)

c) Determine the values of B when A = 7. (1mk)

24. A bus company runs a fleet of two types of buses operating between Nairobi and Mombasa. Type A bus has a capacity to take 52 passengers and 200kg of luggage.. Type B carried 32 passengers and 300kg of luggage. On a certain day, there were 500 passenger with 3500kg of luggage to be transported. The company could only use a maximum of 15 buses altogether.

a) If the company uses x buses of type A and y buses of type B. Write down all the inequalities satisfied by the given conditions. (4mks)

b) Represent the inequalities graphically and use your graph to determine the smallest number of buses that could be used. (4mks)

c) If the cost of running one bus of type A is 7,200/= and that of running one bus of type B is sh. 6000. Find the minimum cost of running the buses. (2mks)

END