NAME…………………………………………ADM NO………………………………CLASS ………………………………

 DATE…………………………………

FORM THREE.
121
MATHEMATICS
PAPER 2
JULY
TIME: 2 ½ HOURS

2019 END-TERM II EVALUATION TEST
Kenya Certificate of Secondary Education (K. C.S.E.)

INSTRUCTIONS TO CANDIDATES
1.   Write your name and admission number in the spaces provided
2.   Answer all questions in section I and any five questions in Section II
3.   All Workings and answers must be clearly written in the spaces provided.
4.   Marks may be awarded for correct working even if the answer is wrong.
5.   Non programmable silent electronics and KNEC Mathematical tables may be use, except where otherwise.

FOR EXAMINERS 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									

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

GRAND TOTAL

SECTIONI (50MARKS)
ANSWER ALL QUESTIONS IN THIS SECTION

1. Evaluate using logarithms. [4 Marks]

$$\frac{\sqrt[3]{0.04689}}{51.64 \times 0.793}$$

2. A rectangular card measures 5.3cm by 2. 5cm.Find
   a) The absolute Error in the area of the card. [2Marks]

   b) The Percentage Error in the Area of the card [2Marks]

3. The length of a room is 4m longer than its width. Find the length of the room if its area is 32m². [3 Marks]

4. If 20 Men can lay 36m of a pipe in 8 hours. How long would 25 Men take to lay the next 54m of the pipe? [2 Marks]

5. Expand $(2 + x)^5$ in ascending powers of x up to the term in x^3. Hence, approximate the value of $(2.03)^5$ to 4s.f. (4marks)

6. Simplify by rationalizing the denominator; [2 Marks]

$$\frac{3}{2\sqrt{3} - \sqrt{2}}$$

7. A scientific calculator is marked at sh. 1560. Under hire purchase it is available for a downpayment of sh. 200 and six monthly instalments of sh. 250 each. Calculate;
   a. The Hire purchase price. [2 Marks]

   b. The extra amount paid out over the cash price. [1 Mark]

8. Solve the equation; [3 Marks]
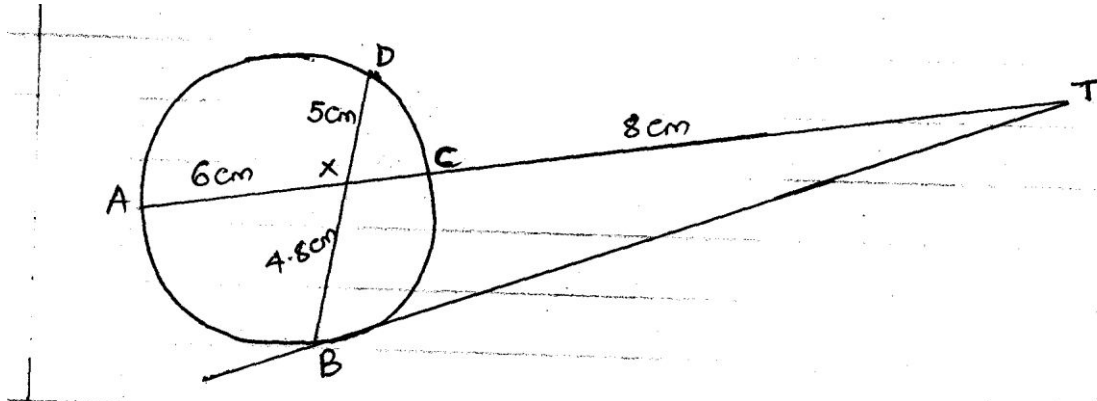
$$\log(2x - 10) - 2\log 8 = 2 + \log(9 - 2x)$$

9. The Equation of a circle is given by $x^2 + y^2$ - 6x + 4y - 3 = 0 . Determine the center and the radius of the circle. [3 Marks]

10. Make x the subject of the formula in the equation. (3mrks)

$$y = \frac{bx}{\sqrt{ax^2 + b}}$$

11. In the figure below, BT is a tangent to the circle to the circle at B. AXCT and BXD are straight lines. AX=6cm, CT=8cm, BX=4.8cm and XD=5cm.

Find the length of;
a. XC [2 Marks]

b. BT [2 Marks]

12. Find the value of x if the matrix $\begin{pmatrix} x & 1 \\ 4 & x-3 \end{pmatrix}$ is a singular matrix. [3 Marks]

13. The first term of an arithmetic sequence is -7 and the common difference is 4.
   a. List the first 6 terms of the sequence [2 Marks]

b. Determine the sum of the first 30 terms of the sequence [2 Marks]

14. The coordinates of points A and B are (2,5) and (8, -7) respectively. Find the
   a) Coordinates of M Which Divides AB in the Ratio 1:2 [2 Marks]

    b) Magnitude of AB [2 Marks]

15. Tap A Fills a tank in 6 hours, tap B fills it in 8 hours and tap C empties it in 10 hours.Starting with an empty tank and all the three taps are opened at the same time, how long will it take to fill the tank. [3 Marks]

16. Grade X of Tobacco Costs Sh.81.50 per Kg and grade Y cost sh 109 per Kilogram. In what ratio must the two grades be mixed in order to make a profit of 20% when the mixture sells at sh. 112.80 per kg.[3 Marks]

17. The figure below shows triangle OAB in which M divides OA in the ratio 2: 3 and N divides OB .in the ratio 4:1 AN and BM intersect at X.
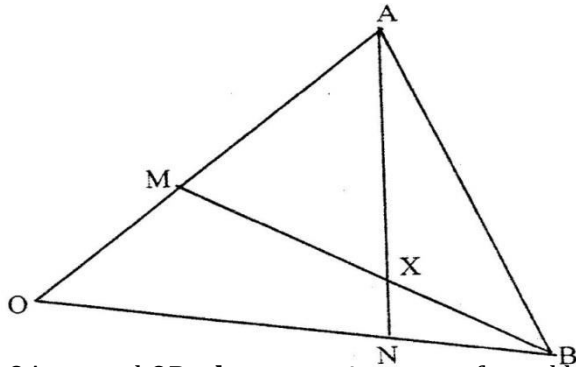
(a) Given that OA = **a** and OB = **b**, express in terms of a and b: (4mks)

      (i) **AN**

      (ii) **BM**

 (b)If **AX** = s **AN** and **BX** = t**BM**, where s and t are constants, write two expressions for **OX** in terms of.**a, b** s and t. Find the value of s and t. Hence write **OX** in terms of a and b   (6mks)

18. Kamau, Njoroge and Kariuki are practicing archery. The probability for Kamau hitting the target is $\frac{2}{5}$, that of Njoroge hitting the target is $\frac{1}{4}$ and that of Kariuki hitting the target is $\frac{3}{7}$.

Find the probability that in one attempt;

a) Only one hits the target   (2mks)

b) All three hit the target   (2mks)

c) None of them hits the target   (2mks)

d) Two hit the target   (2mks)

e) At least one hits the target   (2mks)

19. A matrix T is given by T=$\begin{pmatrix} 4 & 5 \\ 6 & 4 \end{pmatrix}$. Find T^{-1} [2 Marks]

b) Wanjiku bought 20 bags of maize and 25 bags of beans at a total cost of sh. 77,000. If she had bought 30 bags of maize and 20 bags of beans, she would have spent sh. 7,000 more.
   i. Form a matrix equation from this information.   [1 Mark]

   ii. Determine the cost of a bag of maize and a bag of beans.   [3 Marks]

c) She sold all the maize and beans at a profit of 10% on a bag of maize and 12 ½ % on a bag of beans. Calculate the total percentage profit.   [4 Marks]

20. At the beginning of the year 2000, Kanyora bought two houses, one in Thika and the other in Nakuru each at 1,240,000. The value of the house in Thika appreciated at a rate of 12% p.a.
   a. Calculate the value of the house in Thika after 9 years to the nearest shilling.

   [2 Marks]

   b. After n years, the value of the house in Thika was 2,741,245 while the value of the house in Nakuru was 2,917,231.
      i.   Find n [4 Marks]

      ii. Find the annual rate of appreciation of the house in Nakuru.   [4 Marks]

21. The table below shows income tax rates.

Taxable Income In K£ Per Month	Rate in shs. per k£
1 -325	2
326 – 650	3
651 - 975	4
976 - 1300	5
1301 - 1625	6
Over 1626	7

Mr. Wafula earns a basic salary of 30,500. He has a house allowance of sh. 6,000 per month, medical allowance of sh. 4,000 per month and transport allowance of sh. 3,000 per month. He claims a tax relief of sh. 1,056 per month.

a. Calculate
i. Wafula's taxable income in k£ per month. [2 Marks]

ii. Gross tax. [3 Marks]

iii. Net Tax [2 Marks]

b. His net income per month has the following deductions

Health insurance fund – sh. 150
Loan interest – sh. 200
Service charge – sh. 200
Sacco loan – sh. 2,500

Calculate his net income per month. [3 Marks]

22.

a) P varies jointly as Q and the square of R. P = 18 when Q = 9 and R = 15. Find R when P=32 and Q=81.
[5 Marks]

b) A varies Directly as B and inversely as the square root of C. Find the percentage change in A When B is decreased by 10% and C increased by 21%. [5 Marks]

23.
a) The first term of an arithmetic progression is 2. The sum of the first 8 terms of the AP is 240.
i. Find the common difference of the AP. [2 Marks]

ii. Given that the sum of the first n terms of the AP is 1,560. Find n [2 Marks]

b) The 3rd, 5th and 8th terms of another AP from the first three terms of a G.P. If the common difference of the AP is 3. Find.
i. The first term of G. P [4 Marks]

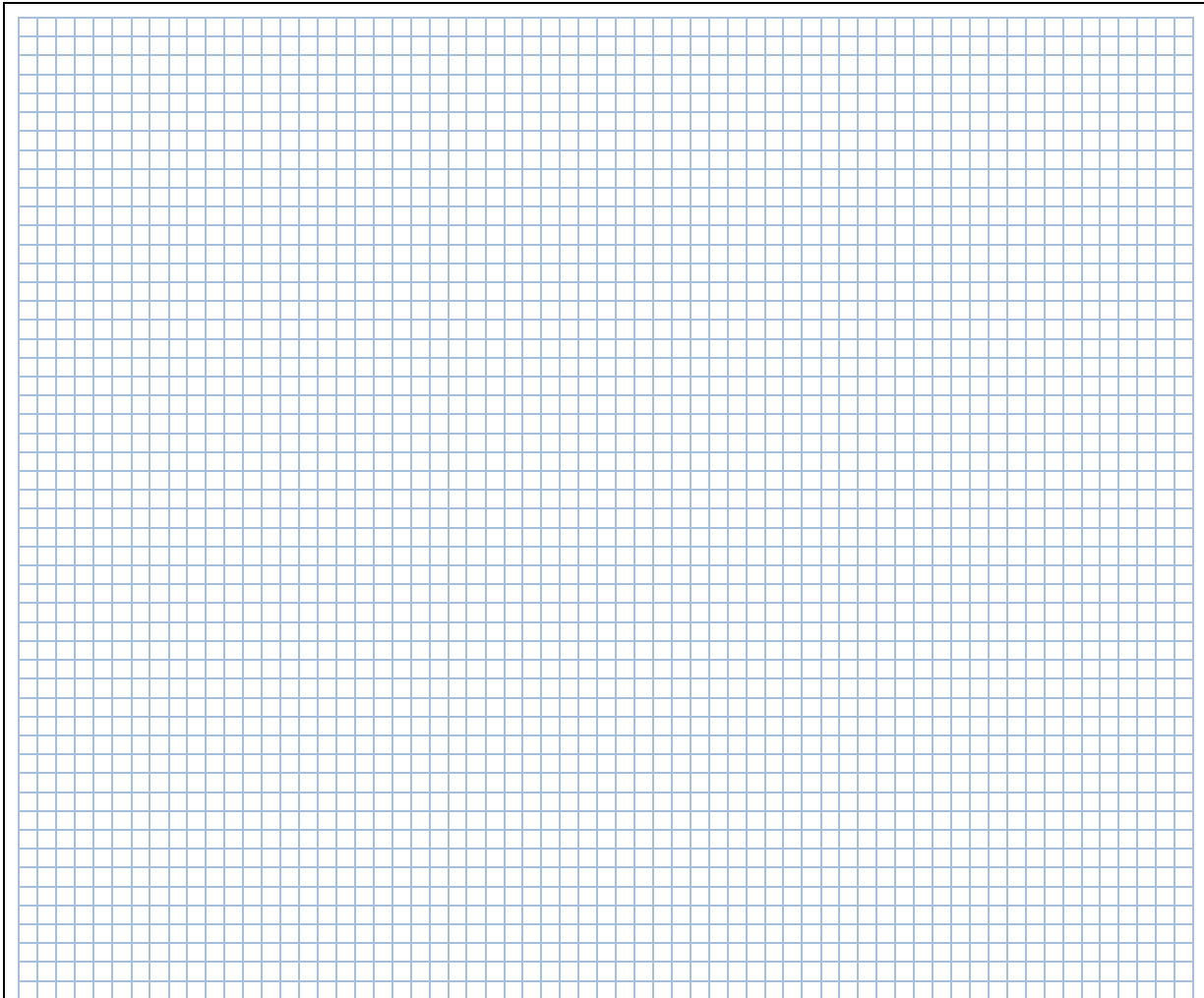ii. The sum of the first 9 terms of the G.P to 4 s.f. [2 Marks]

24.

a) Complete the table below for the function Y=$2x^2 + 4x - 3$ [2 Marks]

x	-4	-3	-2	-1	0	1	2
$2x^2$	32			1	0		8
$4x$	-8	-12	-8			4	8
-3	-3	-3	-3	-3	-3	-3	-3
y	21		-3				

b) On the grid provided, draw the graph of the function $y = 2x^2 + 4x - 3$ for $-4 \leq x \leq 2$ [3 Marks]

c) Use your graph to solve the roots of the quadratic equations.
   i) $2x^2 + x - 5 = 0$ [2 Marks]

   ii) $2x^2 + 3x - 2 = 0$ [2 Marks]

   iii) $x^2 + 4x - 3=0$ (1 mark)