# Nyaraya Cluster Examination

**Kenya Certificate of Secondary Education**

**Form Four Mock Evaluation Programme**

**121/2 MATHEMATICS ALT. A Paper 2**

**JULY, 2023 – TIME : 2½ HOURS**

Name: ………………………………………………………………... Adm No: ………………....

Index Number: …….……………............... Candidate’s Signature: …….………

School: ………………………………………… Stream …………………………...

*Instructions to Candidates*

1. *Write your name, Adm. Number and stream in the spaces provided at the top of this page.*
2. *This paper consists of* ***TWO*** *sections:* ***Section I*** *and* ***Section******II****.*
3. *Answer* ***ALL*** *the questions in* ***Section******I*** *and any* ***five*** *questions from Section* ***II****.*
4. ***Show all the steps in your calculation, giving your answer at each stage in the***

***spaces provided below each question****.*

1. *Marks may be given for correct working even if the answer is wrong.*
2. ***Non-programmable*** *silent electronic calculators and* ***KNEC*** *Mathematical tables*

*may be used, except where stated otherwise.*

1. ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing****.*
2. ***Candidates should answer the questions in English****.*

For Examiner’s Use Only

Section I

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | **Total** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Section II

**Grand**

**Total**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | **Total** |
|  |  |  |  |  |  |  |  |  |

***Section I (50 Marks)***

***Answer all the questions from this section***

1. Solve the equation: for (3 marks)
2. A rectangular block has a square base whose side is exactly 8 cm. Its height is measured to the nearest millimetre as 3.1 cm. Find the percentage error in calculating its volume. (3 marks)
3. If and find;
4. The product (1 mark)
5. (2 marks)
6. Draw line , P is a variable point such that . Draw the possible location of point P. (3 marks)
7. Use the first four terms of the expansion to evaluate correct to 3 decimal places. (3 marks)
8. Make y the subject of the formula (3 marks)
9. Tap A can fill a bath in 5 minutes. Tap B can empty a full bath in 10 minutes. Both taps are opened at the same time. After 5 minutes, tap B is closed. How long will it take tap A to fill the bath completely from then. (3 marks)
10. Kola bought a television set on hire-purchase by paying a down payment of ksh. 5000 and monthly instalments of ksh. 1250 for 2 years. If interest rate charged was 12% p.a, what is the carrying charge to the nearest hundreds? (3 marks)
11. Use matrix method to for x and y in the following sets of equation.

 (3 marks)

1. Solve for x given that (3 marks)
2. Nine men have heights of all in cm. Using an assumed mean of 180, calculate the variance to 4 significant figures. (3 marks)
3. Given that and **,** find (3 marks)
4. A farmer has 1000 m of fencing wire to fence a rectangular enclosure. Find the greatest possible area this farmer can fence. (3 marks)
5. The acceleration of a particle a m/s2 is m/s2. Given that the particle has a velocity of 2 m/s after 1 second. Find its displacement in the fourth second. (4 marks)
6. In the figure below, chords PQ and RS intersect externally at T.



 Given that PQ = 4cm, QT = 6cm and RS = 3cm, find RT. (3 marks)

1. In a shooting practice three soldiers A, B and C aim at a target. The probabilities of A, B and C hitting the target are 1/3, 1/4 and 1/2 respectively. The three soldiers shot at the target only once; one after the other. What is the probability that the target was hit only once? (4 marks)

***Section II (50 Marks)***

***Answer any five questions from this section.***

1. A ship sends a radio signal saying she is in distress and giving her position as.

The signal is picked up by a ship A at and a ship B at. Both ships move at a speed of.

1. Calculate the length of time that each captain should indicate that it will take to come to the rescue, assuming that A sails due West and B sails due south. (6 marks)
2. If the distressed ship is drifting due East at . Find the new position she should radio call 16 hours later. (2 marks)
3. Find the local time and day at when the local time at is 0045H on Monday. (2 marks)
4. Two hundred people were asked how much water they drink per day. The table below shows the results.

|  |  |  |
| --- | --- | --- |
| Amount of water (X litres) | No. of people | Cumulative frequency |
|  | 8 |  |
|  | 27 |  |
|  | 45 |  |
|  | 50 |  |
|  | 39 |  |
|  | 21 |  |
|  | 7 |  |
|  | 3 |  |

1. Develop a cumulative frequency column (1 mark)
2. On the grid provided below, draw a cumulative frequency curve using a scale of 2 cm for one litre on the x – axis and 1 cm for 20 people in the y- axis. (3 marks)
3. Using your graph;
4. Find the median (1 mark)
5. The quartile deviation (2 marks)
6. Find the number of people who consumed at least 2.6 litres per day. (1 mark)
7. Find the percentage number of people who did not drink enough water given that the doctor recommends at least 1.8 litres per day. (2 marks)
8. Triangle ABC with vertices undergoes a transformation T denoted by the matrix to obtain triangle .
9. Draw triangle ABC and its image under T on the same axes. (4 marks)
10. Describe the transformation T fully. (1 mark)
11. Under another transformation M, triangle is mapped on to triangle with . Find the matrix of transformation M (4 marks)
12. Describe the single transformation that maps triangle onto triangle ABC (1 mark)
13. A relief organization has to transport at least 80 people and at least 18 tonnes of supplies to a site. There are two types of vehicles available; type A and type B. type A can carry 900 kg of supplies and 6 people while type B can carry 1350 kg of supplies and 5 people. There are at most 12 vehicles of each type available. By taking x to represent the number of vehicles of type A and y to represent the number of vehicles of type B.
14. Write down all the four inequalities to represent the above information. (4 marks)
15. On the grid provided, draw all the inequalities in (a) above. (4 marks)
16. Use the graph in (b) above to determine the least number of vehicles of each type required at the site. (2 marks)
17. An arithmetic progression has the first term (a) and common difference (d).
18. Write down the third, the ninth and twenty fifth terms of the AP. (1 mark)
19. The AP is increasing and the 3rd, 9th, and 25th terms form the first three consecutive terms of the GP. If the sum of the seventh term and twice the sixth terms of the AP is 78, calculate:
20. The first term and the common difference of the A.P. (4 marks)
21. The common ratio of the GP (2 marks)
22. The sum of the first nine terms of the A.P. (3 marks)
23. In the figure below E is the midpoint of BC. AD: DC 3:2 and F is the meeting point of BD and AE.



1. If AB = **b** and AC = **c,** find:
2. BD (2 marks)
3. AE (2 marks)
4. If **BF = *t* BD** and **AF = *n* AE**. Find the value of t and n. (5 marks)
5. State the ratio of BD to BF. (1 mark)
6. The table below shows income tax rates

|  |  |
| --- | --- |
| Monthly taxable pay (k£) | Rate of tax ksh per £ |
| 1- 435436 – 870871 – 13051306 – 1740Excess over 1740 | 23456 |

 A company employee earns a monthly basic salary of Ksh 28,000. He is also entitled to the following monthly allowances: house allowance of Ksh 9000, a medical allowance of sh 2000 and a commuter allowance of shs 1480.

1. Calculate his total income tax. (5 marks)
2. He is entitled to a personal tax relief of Ksh 1056 per month. Determine the net tax. (1 mark)
3. If he received a 50% increase in his total income, calculate the corresponding percentage increase on the income tax. (4 marks)
4. The equation of a curve is given y = x3 + 4x2 – 2
	* 1. Determine the coordinates of the turning points of the curve, correct to 1 decimal place and state their nature (4 marks)

 b) Use the equation of the curve to complete the table below. (1 mark)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | -4 | -3 | -2 | -1 | 0 | 1 |
| y | -2 |  | 6 | 1 |  |  |

c) i) On the grid provided, use the solutions in part (a) and the values in

 the table in part (b) to draw the curve for . (3 marks)

 ii) Use the graph to solve the equation x3 + 4x2 – 2 =0 (2 marks)