

NAME: ADM. No:

SCHOOL..... INDEX No..... STREAM:

MATHEMATICS ALT A

121/1

Paper 1

Time: 2 ½ hours

NYAHOKAKIRA CLUSTER II EXAMINATIONS 2024

Kenya Certificate of Secondary Education

INSTRUCTIONS TO CANDIDATES

- (a) Write your **name, Admission number, school, index number** and **stream** in the spaces provided above.
- (b) This paper consists of **TWO sections: Section I** and **Section II**.
- (c) Answer **ALL** the questions in **Section I** and **only five questions** from **Section II**.
- (d) All answers and workings must be written on the question paper in the spaces provided below each question.
- (e) Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
- (f) Marks may be given for correct working even if the answer is wrong
- (g) Non-programmable silent electronic calculators and KNEC Mathematical tables may be used, except, where stated otherwise.
- (h) This paper consists of **16 printed pages**.
- (i) Candidates should check the question paper to ascertain that all the pages are printed as indicted and that no questions are missing.

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

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

SECTION I (50 MARKS)*Answer ALL questions in this section*

1. Without using calculator, evaluate $\frac{-2(4-7)+8(-5+3)}{-5+(-8+2)}$ (3marks)

2. Solve for α in $2\sin(2\alpha + 20) - 2\cos(-\alpha - 30) = 0$ (2marks)

3. Given the inequalities $x - 6 \leq -3x + 2 < -2x + 9$

(a) Solve the inequality and give your answer as a compound inequality (3 marks)

(b) Represent on a number line (1 mark)

4. Mutai imports rice from United States at the initial cost of 500 US dollars per tonnes. He then pays 20% of this amount as shopping costs and 10% of the same amount as custom duty. When the rice reaches Mombasa he has to pay 6% of the initial cost to transport it to Nairobi. Given that on the day of this transaction the exchange rate was 1 us dollar = kshs 76.60. Calculate the total cost of importing one tonne of rice up to Nairobi in Kenya shillings. (4marks)

5. The number of sides of two regular polygons are in the ratio 3 : 4. The sum of the interior angles of the two polygons are in the ratio 2 : 3. Calculate the number of sides of the two polygons. (3marks)

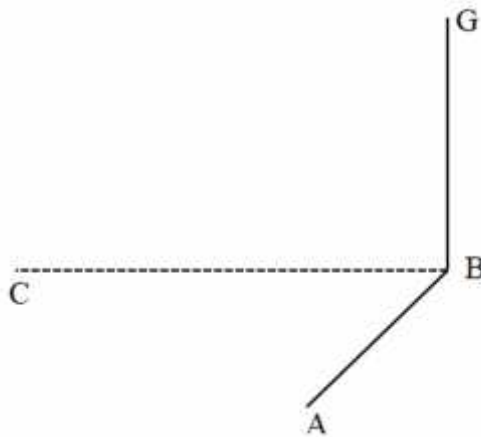
6. Simplify completely $\frac{3(x+y)}{x^2+xy-2y^2} + \frac{3x+y}{x^2-y^2}$ (3 marks)

7. The mean of n numbers is 20. If the same numbers together with 30 have a mean of 21.25, find the value of n . (3marks)
8. A hollow cylindrical alloy of length 40mm has a mass of 352g. If its internal radius is 3cm and its 0.01m thick; calculate the density of the metal used to make the alloy in kg/m^3 . Use $\pi = \frac{22}{7}$ (3marks)
9. Two similar solids have masses of 1000g and 1728g. If it costs Ksh 330 more to paint the surface of the larger solid, find the amount it will cost to paint the surfaces of 5 such smaller solids (4marks)

10. A watch loses 8 seconds every hour. It was set to read the correct time at 1100h on Monday.
Determine the time in the 12 hour system, the watch will show on the Thursday of the same week
when the correct time is 0500h (3 marks)

11. A perpendicular line is drawn from the point $(2, 1)$ to the line $\frac{1}{2}x + 2y = -3$. Find the equation of the
perpendicular leaving your answer in the form $ax + by = c$ (3 marks)

12. Below is part of a sketch of a solid cuboid ABCDEFGH. Complete the sketch (3marks)



13. Solve for X in the following equation without using a calculator or a mathematical table

$$9^x(27^{(x-1)}) = \tan 30^\circ$$

(3 marks)

14. A plane leaves town P for town Q on a bearing of $S50^\circ E$ and a distance of 350 km. It then flies 500 km on a bearing of 060° to town R. Find, by scale drawing, the distance between town R and town P (take the scale: 1:5 000 000) (3marks)

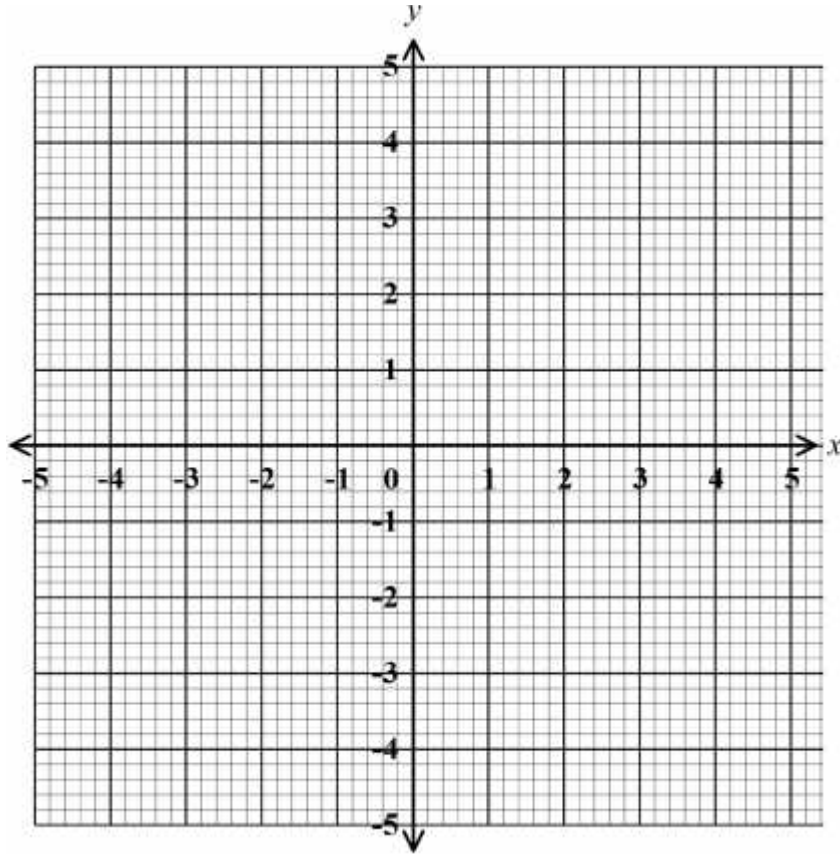
15. Given the column vectors $a = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$, $b = \begin{pmatrix} -3 \\ -9 \end{pmatrix}$ and $c = \begin{pmatrix} 5 \\ -7 \end{pmatrix}$ and that $p = 2a - \frac{1}{3}b + c$. Find the magnitude of p to 3 significant figures. (3marks)

16. Using the grid provided below, solve the simultaneous equation

(3marks)

$$3x - 4y = 10$$

$$5x + 7y = 3$$



SECTION II: (50 MARKS)

Answer ANY Five questions.

17. The frequency table below shows the daily wages paid to a casual workers by a certain company

| | | | | | |
|--------------------|-----------|-----------|-----------|-----------|-----------|
| Wages in shillings | 100 – 150 | 150 – 200 | 200 – 300 | 300 – 400 | 400 – 600 |
| No. of workers | 160 | 120 | 380 | 240 | 100 |

(a) Calculate the mean wage

(3marks)

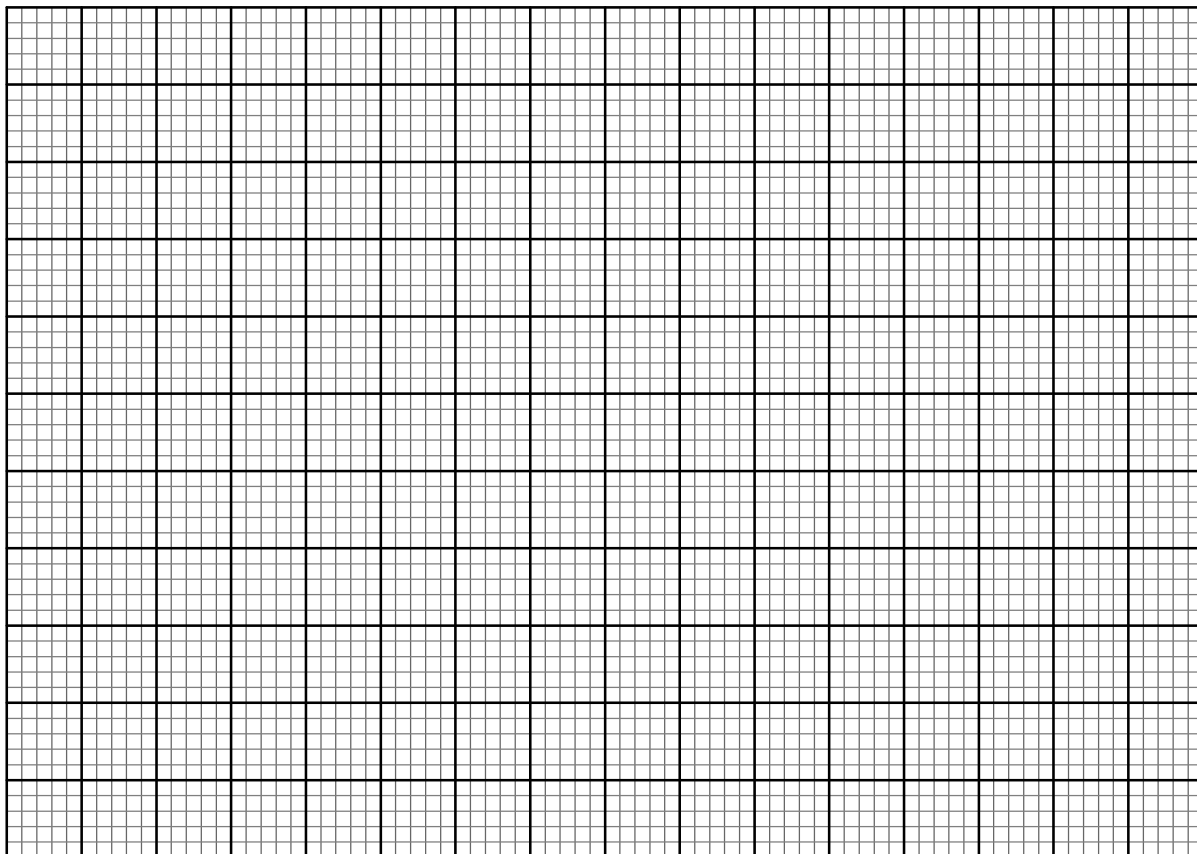
(b) (i) Complete the table below

(1 mark)

| | | | | | |
|--------------------|-----------|-----------|-----------|-----------|-----------|
| Wages in shillings | 100 – 150 | 150 – 200 | 200 – 300 | 300 – 400 | 400 – 600 |
| Frequency density | 3.2 | | 3.8 | 2.4 | |

(ii) On the grid provided below, draw a histogram to represent the above information

(3marks)



iii) By drawing a vertical line on the histogram above, estimate the median wage (3marks)

18. During a charity walk to raise funds for funding water project in Kenya. Koech, Odhiambo and Bosibori decided to walk from Kisumu to Kisii a distance of 250km, at an average speed of 4 km/hr. Each day they begin their walk at 5.00 a.m and after walking 4 hours, take a break of 30 minutes then walk for the next 3 hrs after which they have a lunch break for 1 ½ hours. Their final leg for the day last 3 hours.

(a) Find the time:-

(i) When their first break ends. (1 mark)

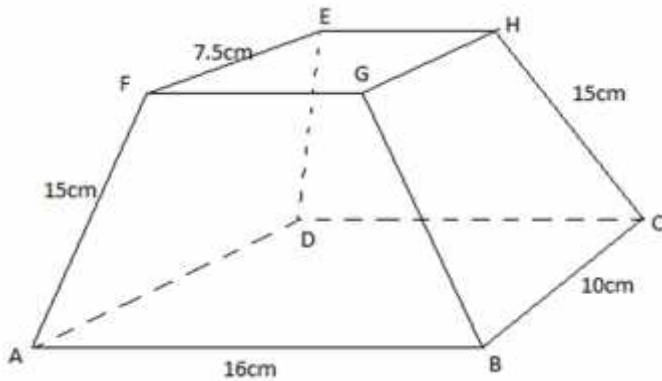
(ii) When their lunch time begins. (1 mark)

(iii) When their day ends. (1 mark)

(b) Find the number of days they will take to complete the journey. (3 marks)

(c) For every hour walk, the sponsors pay sh. 60,000, shs 40,000 and ksh. 35,000 to Koech, Odhiambo and Bosibori respectively. Find the total amount of money raised by the three at the end of their charity walk. (4 marks)

19. The figure below shows a frustum made from a right pyramid, such that $AB=DC=16\text{cm}$, $BC=AD=10\text{cm}$, $FG=EH=18\text{cm}$, $GH=FE=7.5\text{cm}$, $CH=BG=AF=DE=15\text{cm}$. If the altitude of the frustum is 14.6cm , find:



- (a) The altitude of the pyramid made from the frustum.

(2marks)

- (b) The surface area of the frustum.

(5marks)

- (c) The volume of the frustum.

(3marks)

20. A matatu left Rapogi for Homabay town 51km away at an average speed of 48km/h at 8.00am. At 8.30am a Boda boda left Homabay for Rapogi travelling along the same route at an average speed of 60km/h

(a) The time when Boda boda meet the matatu (3marks)

(b) How far from Rapogi did the Boda boda meet the matatu (3marks)

(c) After meeting the Boda boda the matatu stopped for fifteen minutes before resuming the journey. At what speed should it travel then to reach Homabay at the same time when the Boda boda reached Rapogi (4marks)

21. Using a pair of compass and a ruler only

(a) Construct triangle ABC in which $AB = 6$ cm, $AC = 4.5$ cm, and angle $CAB = 60^\circ$

(2marks)

(b) Measure

(i) BC

(1mark)

(ii) Angle ACB

(1mark)

(c) A point N is on AB such that CN is the shortest distance from C to line AB. Construct CN and measure its length

(2marks)

(d) (i) AB is produced to D such that $AD = 10$ cm. Construct a circle to touch BC and AB produce

(3 marks)

(ii) Measure the radius of the circle in (d)(i) above

(1mark)

22. Onyango and Wairimu bought some items from hardware. Onyango bought 11 bags of cement, 40 Iron sheets and 6 litres of paint while Wairimu bought 14 bags of cement, 30 Iron sheets and 5 litres of paint. The prices of a bag of cement, a piece of iron sheet and a litre of paint were sold for Ksh. 90, Ksh.50 and Ksh.70 respectively.

(a) Represent:

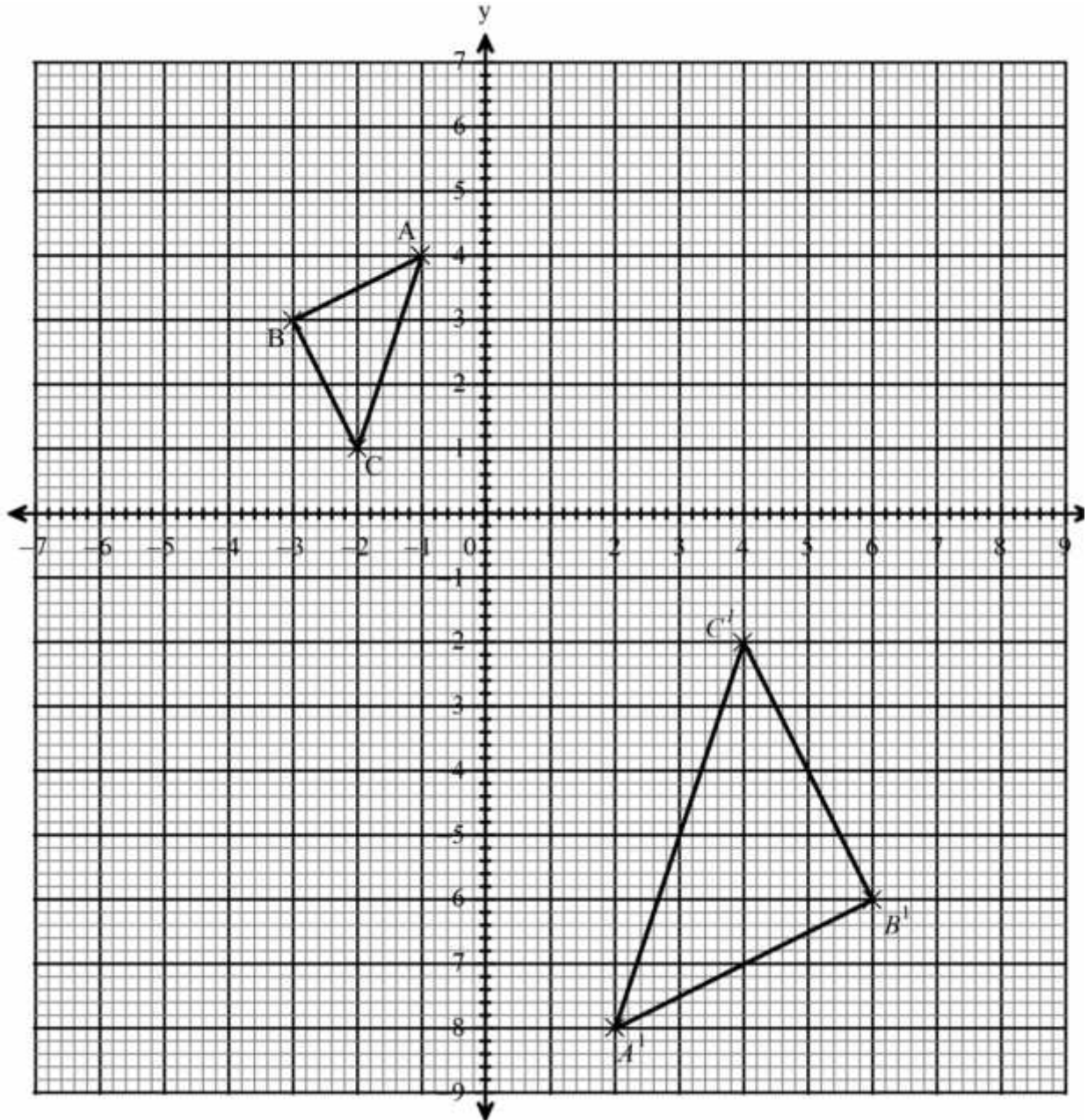
(i) The number of items bought by Onyango and Wairimu using 2×3 matrix. (1mark)

(ii) The price of the item bought using 3×1 matrix. (1mark)

(b) Using the matrices in (a) above to determine the total expenditure incurred by each person hence the difference in their expenditure. (3marks)

(c) Amani and Wafula also bought bags of cement and Iron sheets. Amani bought 36 bags of cement and 23 iron sheets and paid Ksh. 8,160 while Wafula bought 50 bags of cement and 32 Iron sheet and paid Ksh. 11,340. Use the matrix method to determine the price of a bag of cement and a piece of Iron sheets. (5marks)

23. Triangle ABC and $A^1B^1C^1$ are drawn on the grid provided.



(a) Describe a single transformation that mapped triangle ABC onto triangle $A^1B^1C^1$. (2 marks)

(b) On the same grid, draw;

(i) Triangle $A^{11}B^{11}C^{11}$ the image of triangle $A^1B^1C^1$ under a rotation of $+90^\circ$ about $O(0,0)$. (2 marks)

(ii) Triangle $A^{111}B^{111}C^{111}$, the image of triangle $A^{11}B^{11}C^{11}$ under a reflection in the line $y = -x$. (2 marks)

(c) Draw the line of symmetry of triangle $A^1B^1C^1$ and hence determine its equation in the form $y = mx + c$, where m and c are constants. (4 marks)

24. The distance S metres from a fixed point O , covered by a particle after t seconds is given by the equation $S = t^3 - 6t^2 + 9t + 5$

(a) Calculate the gradient of the curve at $t = 0.5$ seconds (3marks)

(b) Determine the turning points of the curve $S = t^3 - 6t^2 + 9t + 5$ (4marks)

(c) Sketch the curve (3marks)

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