CHAMPIONS JET II, 2024

Kenya Certificate of Secondary Education

121/1	**MATHEMATICS ALT. A**	**Paper 1**

JULY 2024 – TIME : 2½ HOURS

Name: …...…….. Adm No: …….………

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

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

Instructions to Candidates

(a) *Write your name, Adm. Number and stream in the spaces provided at the top of this page.*
(b) *This paper consists of **TWO** sections: **Section I** and **Section II**.*
(c) *Answer **ALL** the questions in **Section I** and any **five** questions from Section **II**.*
(**d**) *Show all the steps in your calculation, giving your answer at each stage in the spaces provided below each question.*
(e) *Marks may be given for correct working even if the answer is wrong.*
(f) ***Non-programmable** silent electronic calculators and **KNEC** Mathematical tables may be used, except where stated otherwise.*
(g) *This paper consists of 15 printed pages.*
(h) *Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.*
(i) *Candidates should answer the questions in English.*

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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**

Grand Total

SECTION I (50 marks)

*Answer **all** questions in this section in the spaces provided*.

1. A watch that gains three seconds every hour was set to indicate the correct time at 2350 hours on Monday. Determine the time in 12hours clock system the watch will indicate on Friday at 0750 hours. (3marks)

2. A circular paper of diameter AB has an area of 5544cm². The paper is divided into two semicircular papers by slitting it along AB. Find the perimeter of each semicircular paper. (3marks)

3. Without using mathematical tables, evaluate: $3^{-2x+1} - 10(3^{-x}) + 3 = 0$ (3 marks)

4. The angles of a pentagon and $2x, (x - 10), 4x, (2x - 25)$ and $(3x - 25)$. Find the size of the largest angle. (3marks)

5. Simplify; $\dfrac{15a^2 - 16ab - 15b^2}{9a^2 - 25b^2}$ (3marks)

6. A certain beautiful lady named Jane wanted to go to heaven a live. She was asked by a priest to give away all her earthly wealth to the destitute. On the valentine Day (February 14th) of the year 2014 alone, she gave away $\dfrac{1}{14}$ of all her clothes to prisoners rent $\dfrac{2}{9}$ of $\dfrac{5}{8}$ of the remaining clothes to the sick. Later on that day, she gave away the rest of the clothes to the refugees. If the refugees got 676 more clothes than the sick, determine the total number of cloths Jane gave away on that valentine day. (3marks)

7. The coordinator of triangles ABC and $A(4.75, 8.5), B(15,5)$ and $C(10.75, 1.5)$. The coordinates of triangle PQR are $P(x, y), Q(m, n)$ and $R(d, e)$. if A,B and C are the mid points of lines PQ,QR and PR respectively, calculate the coordinates of the points P,Q and R. (3marks)

8. Write down four inequalities that defines the unshaded region marked R in the diagram below

(4marks)
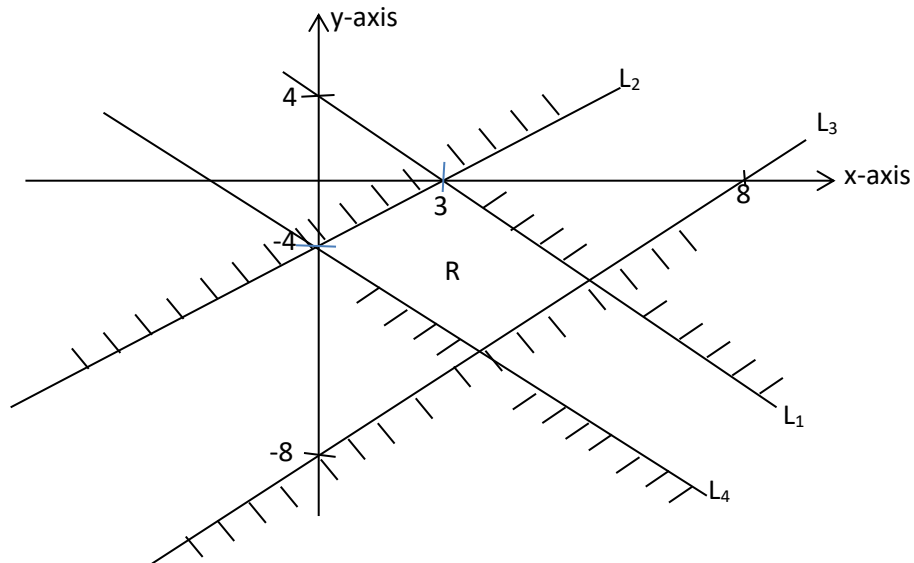
9. Find the value of x given that; $\frac{1}{4}\sin 3x^o - \frac{1}{4}\cos(2x - 45^0) = 0$, for $0^0 \le x \le 90^0$ (3marks)

10. A commercial Bank buys and sells foreign exchange using the rates shown below:

|	Buying	Selling
1 US $	Ksh. 83.25	Ksh. 84.05

An American tourist arrived in the country with Us $ 8175 and exchanged 80% of the cash to local currency. While in the country he spent Ksh. 443,595 and bought USA dollars with the remaining amount. Determine the USA dollars he had as he left the country. (3marks)

11. Given line $AB = 5.4cm$, construct a triangle ABC in which $< \text{BAC} = 30^0$ and $BC = 7.5cm$. Drop a perpendicular from point C to meet AB produced at N. Using the height CN, determine the area of the triangle ABC (3marks)

12. A distributor intended to distribute a total of 3627 pens to certain schools. Each school had to receive equal number of pens from the distributor. However, 8 schools were inaccessible and as a result the remaining schools had to receive 24 more pens than what the distributor had planned to supply originally. Taking x as the original number of schools that were meant to get the pens, form a quadratic equation in x, hence find how many pens did each of the remaining schools get.

(4marks)

13. Below is part of sketch of a wedge ABCDEF. Complete the sketch of the solid, showing the hidden edges with broken lines. (3marks)
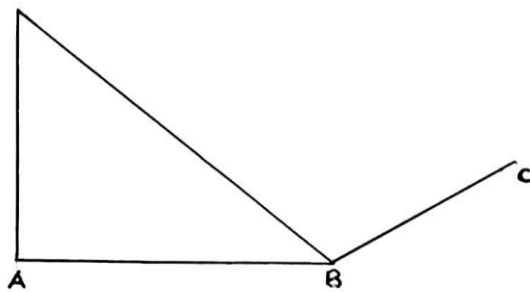
14. Momanyi paid Khs. 160 for a shirt after getting a discount of 20%. The vender made a profit of 30% on sale of this shirt. What percentage profit would the vender have made if no discount was allowed. (3marks)

15. A point P is 40m on a bearing of 320^0 from a point R. The bearing of point Q from R is 080^0 and 60m from it. Using a scale of 1cm to represent 10m show the relative positions of P,Q and R, hence find the distance PQ. (3marks)

16. Use square roots, reciprocals and square tables to evaluate (3marks)

$$\left(\frac{1}{\sqrt{0.7235}}\right)^2 - 10.56^{-1}$$

SECTION II

17. a) A Carina car whose length is 16m is moving in the same direction as a probox car. The carina is moving at a constant speed of 60km/h while the probox is moving at a constant speed of 45km/h. The length of the probox is 9m. The carina car is behind the probox on a parallel stretch of a road and it is beginning to overtake the probox car. Calculate the time is seconds, it will take to completely overtake the probox car. (3marks)

b). The distance between Siaya and Nakuru is 640km. a Toyota car left Siaya for Nakuru at 0640 hours at a constant speed of 64km/h. At 0940 hours of same day, a Nissan car left Nakuru for Saya at a constant speed of 48km/h. The two vehicle used the same road.

i). Find the time in 24hours clock system when the Toyota met the Nissan (4marks)

ii). Immediately the two vehicles met, the Toyota rested for 80 minutes. Calculate the new average speed the Toyota had to engage in order to reach Nakuru at the same time when Nissan reached Siaya. (3marks)

18. A particle travels in a straight line through a fixed point O. Its distance, S metres from O is given by $S = 3t^3 - 27t + 4$ where t is the time in seconds after passing point O.
Calculate :

a).The time when the particle is momentarily at rest (3marks)

b).The maximum speed attained by the particle. (3marks)

c). The accelerate when t=4 (1mark)

d).The distance travelled during the 2nd second (3marks)

19. Forty students in from two class were weighed and their masses recorded to the nearest kilograms as shown below.

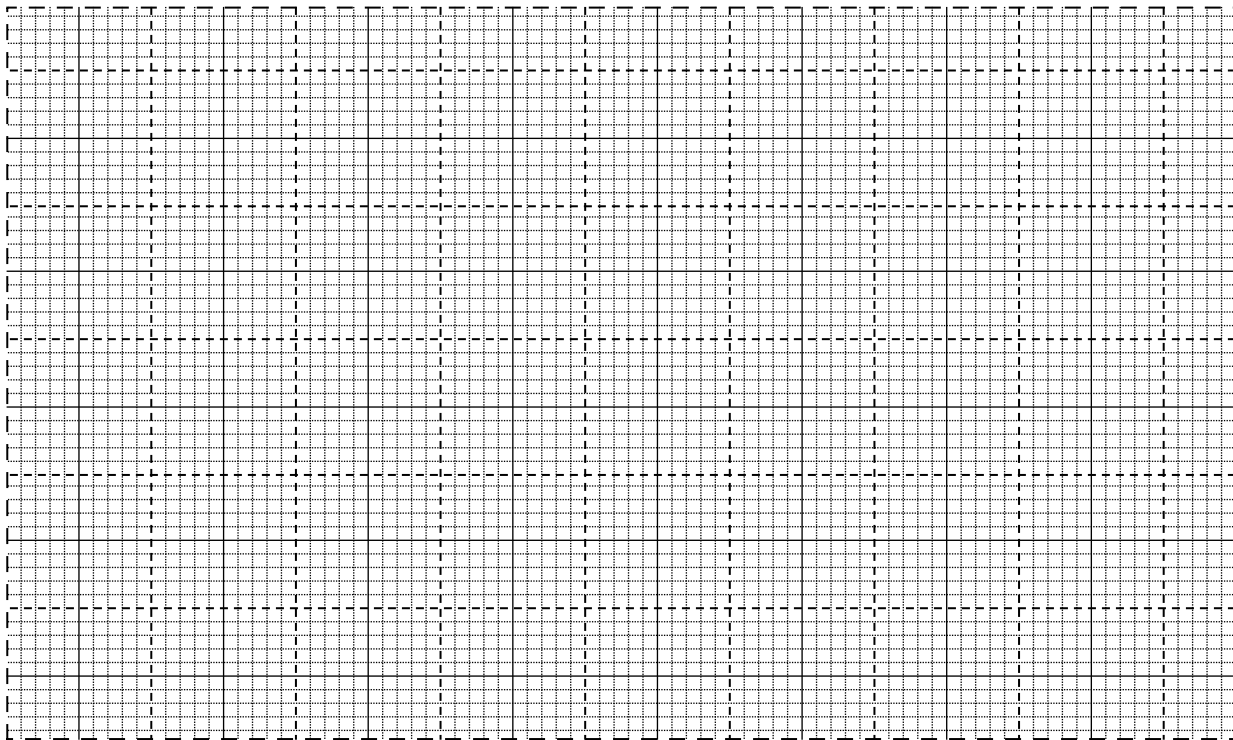| 45 | 48 | 56 | 39 | 47 | 36 | 45 | 49 | 50 | 46 |
37	46	33	43	51	42	47	36	42	48
47	40	46	41	45	43	46	50	38	45
54	42	51	39	42	45	44	35	52	46

a) Using class size of 5kg and starting with 33-37 as the first class, present this data in a frequency distributed table. (2marks)

b). Calculate

i) The mean mass of the students (2marks)

ii) The median mass of the students (3marks)

c). Draw a histogram to represent the data (3marks)

20. a) Find A^{-1} given that $A = \begin{pmatrix} 2 & 4 \\ 3 & 4 \end{pmatrix}$ (2marks)

b). Mary bought 16 shirts and 32 trousers for Ksh. 20800 in January. If she had bought 15 shirts and 20 trousers, she would have saved Ksh. 6300

i).Form a matrix equation to represent the above information   (1mark)

ii). Use matrix A^{-1} to find the price of each item.   (3marks)

c).The following month, the cost of a shirt increased by 10% while that of a trouser increased by 5%. If she bought 12 shirts and 10 trousers, find the percentage increase in the total cost of both items.   (4marks)

21. A straight line $L1; 9y - 6x = -6$ meet the x-axis at R
a).Determine the coordinator of R   (2marks)

b). A second line L_2 is perpendicular to L_1 at R. Find the equation of L_2 in the form $ax + by = c$; when a,b and are constant   (3marks)

c).A third line L_3 passes through $(-4,3)$ and is parallel to L1. Find
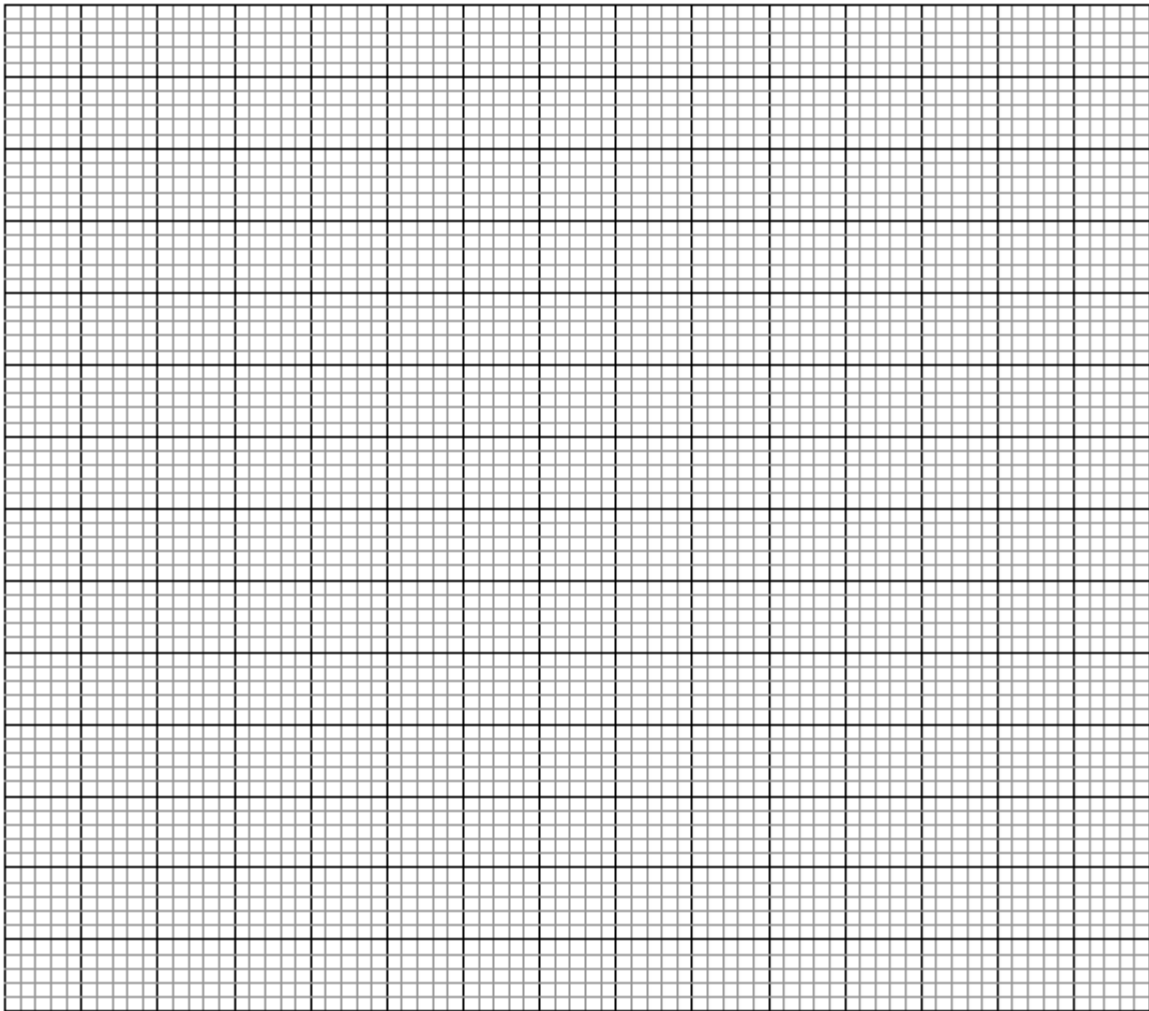i). the equation of L_3 in the double intercept form.   (2marks)

ii). The coordinates of point S at which L_3 intersects L_2 (3marks)

22. The points $A(2,6), B(1,1)$ $C(2,3)$ and $D(4,0)$ are the vertices of quadrilateral ABCD
    a).On graph paper, plot the points A,B,C and D and join them to form quadrilateral ABCD
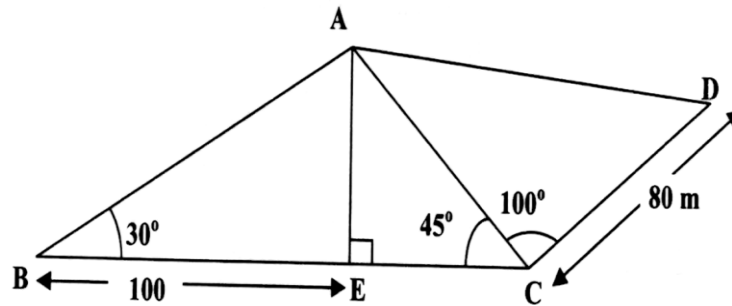   (2marks)

b). The point A^1,B^1,C^1 and D^1 are images of A,B,C and D respectively under an enlargement Centre the origin and scale factor -1. On the same grid, draw the image quadrilateral A^1,B^1,C^1 and D^1 (3marks)

c). The point A^{11},B^{11},C^{11} and D^{11} are the images of A,B,C and D respectively under a reflection in the x-axis. On the same grid, locate the points A^{11},B^{11},C^{11} , D^{11} and draw the second image quadrilateral A^{11},B^{11},C^{11} and D^{11} (3marks)

d). Quadrilateral A^{111},B^{111},C^{111} and D^{111} with verticals A^{111} (-6,2) B^{111}(-1,1) C^{111}(-3,2) D^{111}(0,4) is the image of ABCD under a certain transformation T. Describe transformation T fully.
                                                                                    (2makrs)

23. The figure below represents a quadrilateral piece of land ABCD divided into three triangular plots
The lengths BE and CD are 100m and 80m respectively. Angle ABE = 30^0 $\angle$ACE = 45^0 and
$\angle$ ACD = 100^0

Find to four significant figures:
  (i) The length of AE   (2 marks)

  (ii) The length of AD   (3 marks)

  (iii) the perimeter of the piece of land   (3 marks)

  (b) The plots are to be fenced with five strands of barbed wire leaving an
      entrance of 2.8 m wide to each plot. The type of barbed wire to be used is
      sold in rolls of lengths 480m.Calculate the number of rolls of barbed wire
      that must be bought to complete the fencing of the plots   (2marks)

24. A curve is given by the equation $y = x^3 + 3x^2 - 9x + 2$
    a) Find the equation of the normal to the curve at x=2 (3 marks)

    b) Find its stationary points of the curve $y = x^3 + 3x^2 - 9x + 2$ and hence, state their nature (3marks)

    c) Sketch the curve $y = x^3 + 3x^2 - 9x + 2$ (4marks)