



Kenya Certificate of Secondary Education
MOI GIRLS HIGH SCHOOL-ELDORET

121/1 MATHEMATICS-Alt.A Paper 1
Sept. 2024 - 2 $\frac{1}{2}$ hours
TRIAL EXAMINATION-2024

Name: Index Number:.....

Student's Signature: Date:ADM NO

Instructions to candidates

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) This paper consists of **two** sections: **Section I** and **Section II**.
- (d) Answer **all** questions in **Section I** and only five questions in **Section II**.
- (e) **Show all the steps in your calculations, giving your answers at each stage in the spaces provided 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 15 printed pages.**
- (i) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (j) **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

17	18	19	20	21	22	23	24	Total

SECTION I (50 marks)Answer **all** the questions in this section in the spaces provided.

1. Evaluate without using a calculator; $\frac{\frac{1}{3} \times \frac{4}{7}}{0.2} - \frac{\frac{2}{9} \div (-4^2)}{0.5}$ (3 marks)

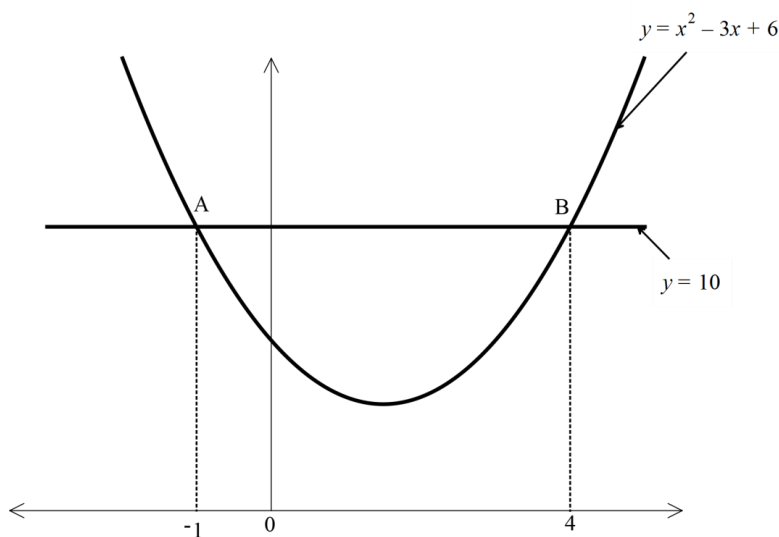
2. Find the values of x which satisfy the equation; $3^{2x} - 4 \times 3^x + 3 = 0$ (4 marks)

3. Under an enlargement of scale factor 3 a point $A(1, 2)$ is mapped onto $A'(13, 8)$. Find the centre of enlargement by calculation. (3 marks)

4. Given that $\sin(5\theta)^\circ = \cos(4\theta)^\circ$, find $\tan(3\theta - 8)^\circ$ giving your answer to 4 significant figures. (3 marks)

5. A flag post 12m long is fixed on top of a tower. From a point on a horizontal ground, the angles of elevation of the top and bottom of the flag post are 46° and 33° respectively. Calculate the horizontal distance from the point on the ground to the foot of the tower. (4 marks)

6. The diagram shows a sketch of a curve $y = x^2 - 3x + 6$ intersecting with the line $y = 10$ for $-1 \leq x \leq 4$ at points A and B.



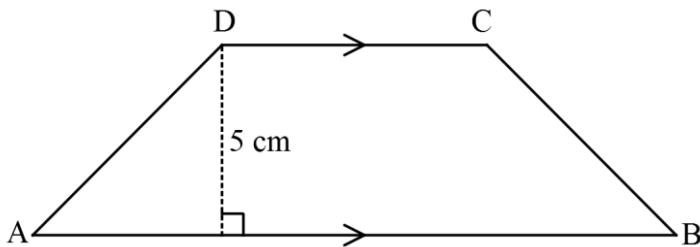
- (a) Complete the table below for *the function* $y = x^2 - 3x + 6$ (1 mark)

x	-1	0	1	2	3	4
y						

- (b) Using trapezium rule with 6 ordinates, estimate the area bounded by the curve $y = x^2 - 3x + 6$ and the line $y = 10$. (3 marks)

7. A carpenter has three wooden bars measuring 10.5 m, 12.6 m and 14.7 m. He cuts the bars into pieces of equal lengths. Calculate the least number of pieces obtained. (3 marks)

8. In the diagram below, ABCD is a trapezium with AB parallel to DC. The perpendicular distance between AB and DC is 5 cm. The area of the trapezium is 40cm^2 and the ratio between AB:DC=3:2.

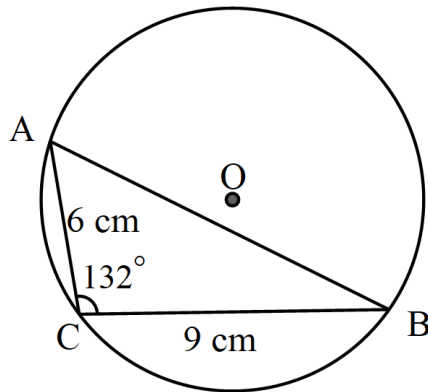


Find the length of AB.

(2 marks)

9. Simplify the following expression; $\frac{p^2 - 2ap - 2a + p}{(p+1)(2a^2 - ap)}$ (3 marks)

10. In the figure below, O is the centre of the circle. $AC=6\text{cm}$, $BC=9\text{cm}$ and angle $ACB=132^\circ$



(a) Calculate the length of AB correct to 2 decimal places. (2 marks)

(b) Calculate the radius of the circle correct to 1 decimal place. (1 mark)

11. Given $\mathbf{A} = \begin{pmatrix} 1 & 3 \\ 2 & 0 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 4 & 2 \\ 1 & 5 \end{pmatrix}$, find the determinant of $\mathbf{A}^2 - \mathbf{B}$. (3 marks)

12. John bought a cooker at Ksh. 27 000 after being allowed a discount of 10%. Calculate the marked price of the cooker. (2 marks)

13. A piece of wire 20cm long is bent into the shape of a rectangle. Find the maximum area it encloses. (3 marks)

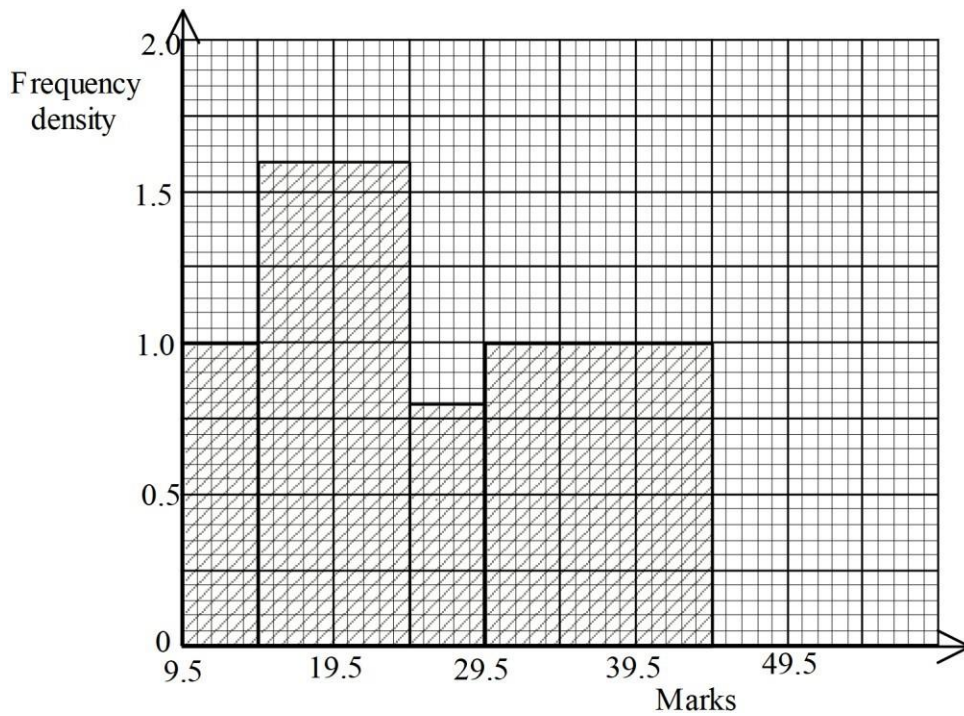
14. Using a ruler and a pair of compasses only, construct;

(a) A rhombus ABCD in which $AC=10\text{cm}$ and angle $BAD = 60^\circ$. (3 marks)

(b) A perpendicular from X , the point of intersection of the two diagonals of the rhombus in 14(a) above to meet AB at N . Measure XN . (1 mark)

15. The length of a rectangular floor of a room is $4m$ longer than the width. If the area of the floor is $96m^2$, find the perimeter of the floor of the room. (3 marks)

16. The figure below shows a histogram of a certain set of data obtained from mathematics test.

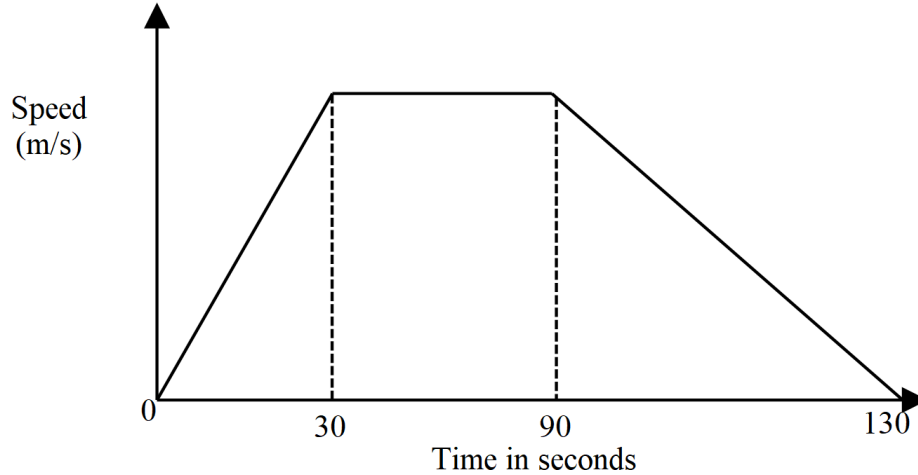


- Draw a vertical line, in the histogram, showing where the median mark lies. Hence estimate the median mark. (3 marks)

SECTION II (50 marks)

Answer only **five** questions from this section in the spaces provided.

17. The diagram below shows the speed – time graph for a bus travelling between two stations. The bus begins from rest and accelerates uniformly for 30 seconds. It then travelled at a constant speed for 60 seconds and finally decelerates uniformly for 40 seconds.



Given that the distance between the two stations is 2090 m, calculate;

- (a) The maximum speed, in km/h the bus attained. (3 marks)
- (b) The acceleration. (2 marks)
- (c) The distance travelled during the last 20 seconds. (2 marks)
- (d) The time the bus takes to travel the first half of the journey. (3 marks)

18. The table below shows the frequency distribution of heights of plants in a tree nursery.

Heights(cm)	0-10	10-20	20-30	30-40	40-50	50-60
Number of plants	4	8	10	k	4	2

The mean height of the plants is 27.5cm.

(a) Determine the value of k. (4 marks)

(b) State;

(i) The modal class. (1 mark)

(ii) The modal frequency. (1 mark)

(c) Calculate the median height of the plants correct to 4 significant figures. (4 marks)

19. Four towns A,B,C and D are such that B is 70km from A on a bearing of 063° . C is 83km and on a bearing of $S30^\circ E$ from B. D is directly to the west of C and on a bearing of 161° from A. Using a scale of 1cm represent 10km;

(a) Show the relative positions of the towns.

(4 marks)

(b) From the diagram, find;

(i) The distance AC

(2marks)

(ii) The bearing of A from C

(1mark)

(c) An express train left town A at 12noon for town D via town B and C. If it arrived at town D at exactly 3.30pm on the same day, calculate the average speed of the train in km/hr. (3 marks)

20. The position vectors of points A and B are $\begin{pmatrix} -1 \\ 8 \end{pmatrix}$ and $\begin{pmatrix} 9 \\ -2 \end{pmatrix}$ respectively.

(a) Determine;

i The magnitude of AB correct to **two** decimal places. (3 marks)

ii The coordinates of M, the mid-point of AB. (2 marks)

(b) A translation vector T maps the point M onto $M^1(3,5)$. Find the coordinates of A under the translation vector T. (3 marks)

(c) A point R is on OM produced such that $2\overrightarrow{OR} = 5\overrightarrow{OM}$. Find the column vector \overrightarrow{AR} . (2 marks)

21. A solid frustrum of cone is such that the radii of the bottom and top circular faces are 5cm and 1.5cm respectively. The slant height of the frustrum is 7cm. (Use $\pi = 3.142$)

Determine correct to **two** decimal places;

(a) The height of the frustrum. (2 marks)

(b) The volume of the frustrum. (4 marks)

(c) The surface area of the frustrum. (4 marks)

22. A triangle PQR is such that angle QPR=90°. The vertices of the triangle are $P(2,4)$, $Q(10,8)$ and $R(m, n)$. The equation of line QR is $2x + 11y = 108$.

(a) Determine:

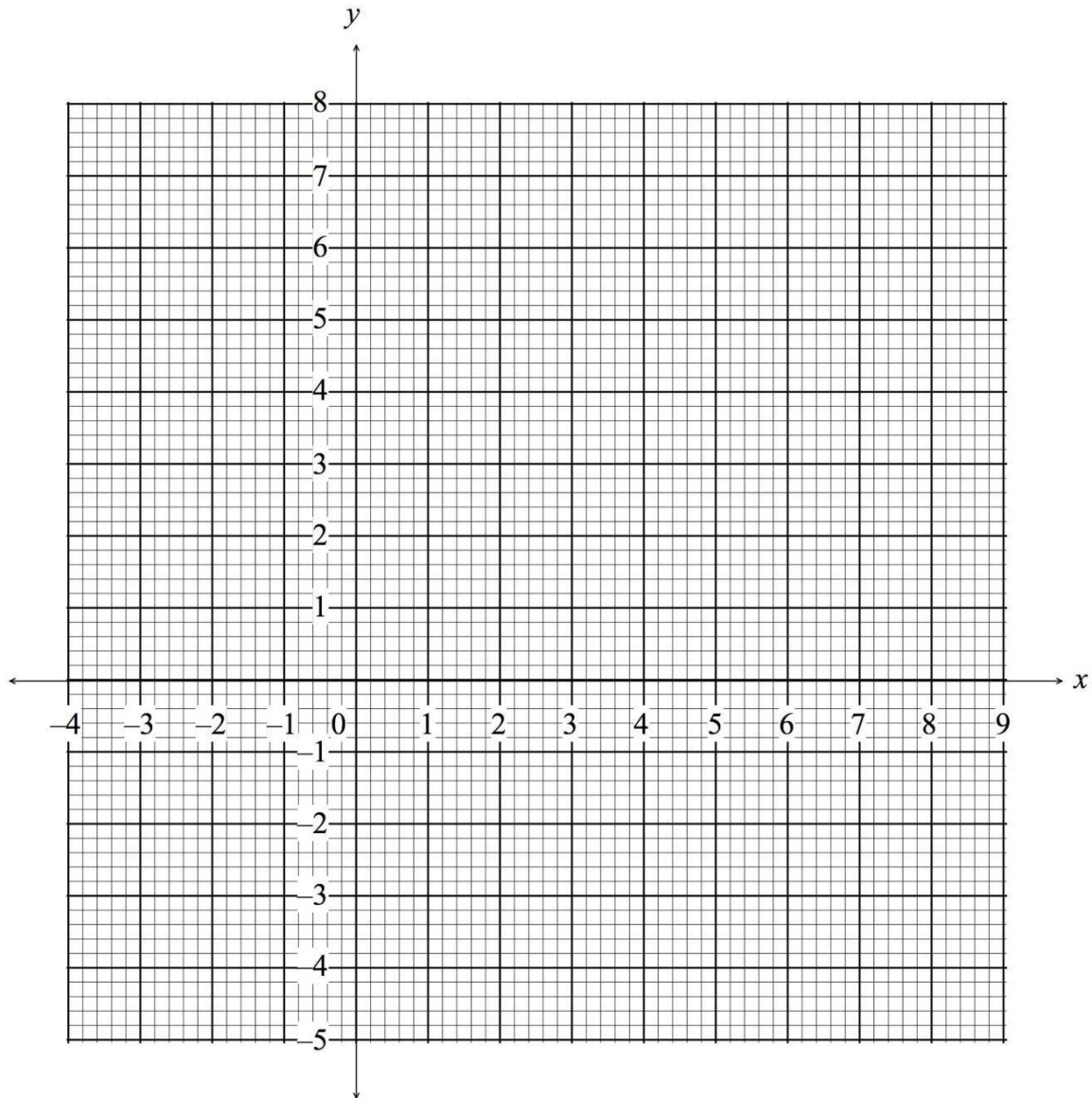
(i) The equation of line PR in the form $ax + by + c = 0$ where a, b and c are integers. (4 marks)

(ii) The coordinates of point R. (3 marks)

(b) A straight line passes through point P and is parallel to line QR. Determine the x-intercept of the line. (3 marks)

23. The vertices of a triangle ABC are A(-1,-2), B(1,-5) and C(2,-1). Triangle A'B'C' is the image of triangle ABC under a reflection in the line $x + y = 3$.

(a) Draw triangles ABC and A'B'C' on the grid provided below. (3 marks)



(b) Draw triangle A''B''C'' the image of A'B'C' under a rotation of $+90^\circ$ about centre (0,0) (2marks)

(c) Draw triangle A'''B'''C''' the image of A''B''C'' under an enlargement whose scale factor is -1 about centre (1, 2). State the coordinates of the image A'''B'''C''' . (3 marks)

(d) State a pair of triangles which are:

i. Directly congruent; (1mark)

ii. Oppositely congruent. (1mark)

24. The equation of a curve is given by $y = 2x^3 - 21x^2 + 36x - 15$.

(a) Determine the stationary points of the curve and state their nature. (5 marks)

(b) Determine;

(i) The equation of a tangent to the curve at a point where $x = 2$ (3 marks)

(ii) The equation of a normal to the curve at a point where $x = 2$ (2 marks)