



MARANDA HIGH SCHOOL

FORM 4 PREMOCK EXAMINATIONS-2024

121/1

MATHEMATICS

Paper 1

Alt. A

March 2024 – 2½ hours

Name: Adm No: Stream:
 Date: Signature:

Instructions to candidates

- Write your name, admission number and stream in the spaces provided above.
- Sign and write the date of examination in the spaces provided above.
- This paper consists of **two** sections: **Section I** and **Section II**.
- Answer **all** the questions in **Section I** and all **any five** questions from **Section II**.
- Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.**
- Marks may be given for correct working even if the answer is wrong.
- Non-programmable** silent electronic calculators **and** KNEC Mathematical tables may be used, except where stated otherwise.
- This paper consists of 16 printed pages.**
- Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- 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

Grand Total

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SECTION I (50 marks)

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

1. Simplify completely $\frac{9a^2y - 16b^2y^3}{4by^2 - 3ay}$ (3 marks)

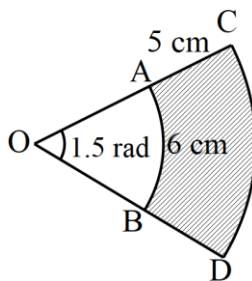
2. The average mass of students in a class of 45 students was 41kg at the beginning of the term. At the end of the term they had each gained 3kg. Calculate their total mass at the end of the term. (3 marks)

3. The straight line passing through the point M(k, -1) and N(-1, 2k) is parallel to line whose equation is $2y - 3x = 8$. Find the value of k and hence write down the coordinates of points M and N. (3 marks)

4. The image of point A $(-3, 4)$ under a translation, T is $A^1 (2, -2)$. If the image of a point B under T is $(0, -1)$. Find the coordinates of B. (2 marks)

5. A regular polygon is such that the interior angle is greater than twice its exterior angle by 45° . Calculate the number of sides of the polygon. (3 marks)

6. In the figure below, AB and CD are arcs of the sectors OAB and OCD respectively. $\angle AOB = 1.5^\circ$, $AB = 6$ cm and $AC = 5$ cm.



- Calculate the area of the shaded region. (3 marks)

7. Use matrix method to solve

(4 marks)

$$5x + 3y = -26$$

$$3x - 4y = -33$$

8. A vertical electric flag post is supported by a slanting piece of wire such that the angle that the wire makes with the pole is twice that which it makes with the ground. If the flag post is 7m in length, find the length of the wire.

(4 marks)

9. Two similar containers are such that their areas are 630 cm^2 and 280 cm^2 , if the mass of the smaller container is 720g, find the mass of the bigger container.

(3 marks)

10. Determine the quadratic equation $x^2 + bx + c = 0$, in which a, b and c are integers, whose roots are $\frac{4}{3}$ and $\frac{1}{2}$. (3 marks)

11. The velocity v metres per second of a particle at time, t seconds is given by the equation $v = t^2 - 2t + 3$. Complete the table below for values of v and t hence use the mid-ordinate rule with four ordinates estimate the distance covered by the particle between $t = 0$ second and $t = 8$ seconds. (4 marks)

Time, t (s)	0	1	2	3	4	5	6	7	8
Velocity v (m/s)	3				11				51

12. A boy has a metal of density 14000 kg/m^3 . He intends to use it to make a rectangular pipe with external dimensions of 18cm by 10cm and internal dimensions of 15cm by 8cm. The length of the pipe is 150cm. Calculate the mass of the pipe in kg. (3 marks)

13. The graph below shows a plot of $\log K$ against $\log L$.



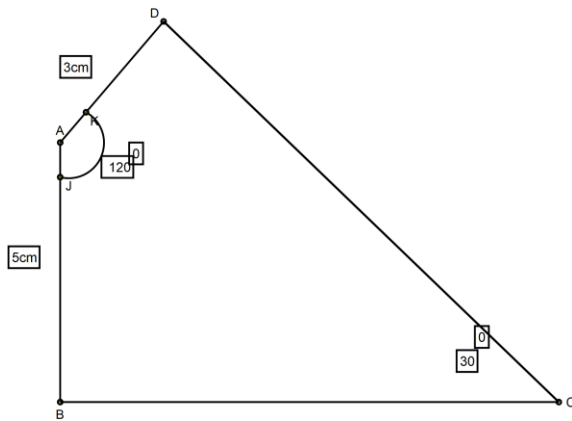
Express K in terms of L .

(3 marks)

14. The distance between two stations Kakira and Luambaga is 200 km. A truck left Kakira for Luambaga at an average speed of 60 km/hr at 8.30 a.m. At 9.18 a.m., a car also left Kakira for Luambaga via the same route as the truck. If the car caught up with the bus at 11.42 a.m., calculate the distance of the vehicles from Luambaga when they met.

(3 marks)

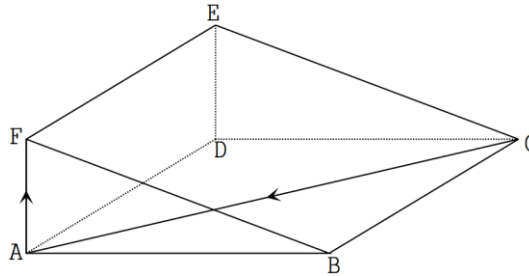
15. The figure below shows quadrilateral ABCD in which $\angle DAB = 120^\circ$, $\angle DCB = 30^\circ$ and $\angle ABC = 90^\circ$ and also lengths $AB=5\text{cm}$ and $AD=3\text{cm}$.



Calculate length DC to three significant figures.

(3 marks)

16. The figure below shows a wedge with a string wound on its surface once from C to A to F.



Draw the net of the solid and show the path of the string if it does not cut.

(3 marks)

SECTION II (50 marks)

Answer any **five** questions in this section in the spaces provided.

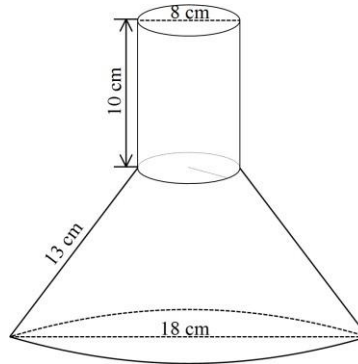
17. A teacher shared pencils amongst his learners. The girls received two thirds of the pencils while the boys received five sixths of the remainder. If the teacher still remained with 8 pencils, calculate the:

(a) number of pencils the teacher had at the beginning. (4 marks)

(b) amount of money the teacher spent in purchasing the pencils given that he was charged Ksh. 25 per every six pencils. (3 marks)

(c) number of learners in the class if each girl got three pencils and each boy two. (3 marks)

18. The figure below represents a container consisting of a cylindrical part of internal diameter 8 cm and a conical part of internal diameter 18 cm. The slant length of the conical part is 13 cm and the height of the cylindrical part is 10 cm.



Calculate in terms of π the:

a) internal surface area of the container.

(5 marks)

b) volume of solid

(5 marks)

19. Four pegs P, Q, R and S are on the vertices of a plain field. Q is 300 m north of P and S is 420m East of P. The bearing of R from Q is 110° and the bearing of S from R is $S20^\circ E$.

a) Using a scale of 1 cm to represent 60 m, represent the information on a scale drawing. (5 marks)

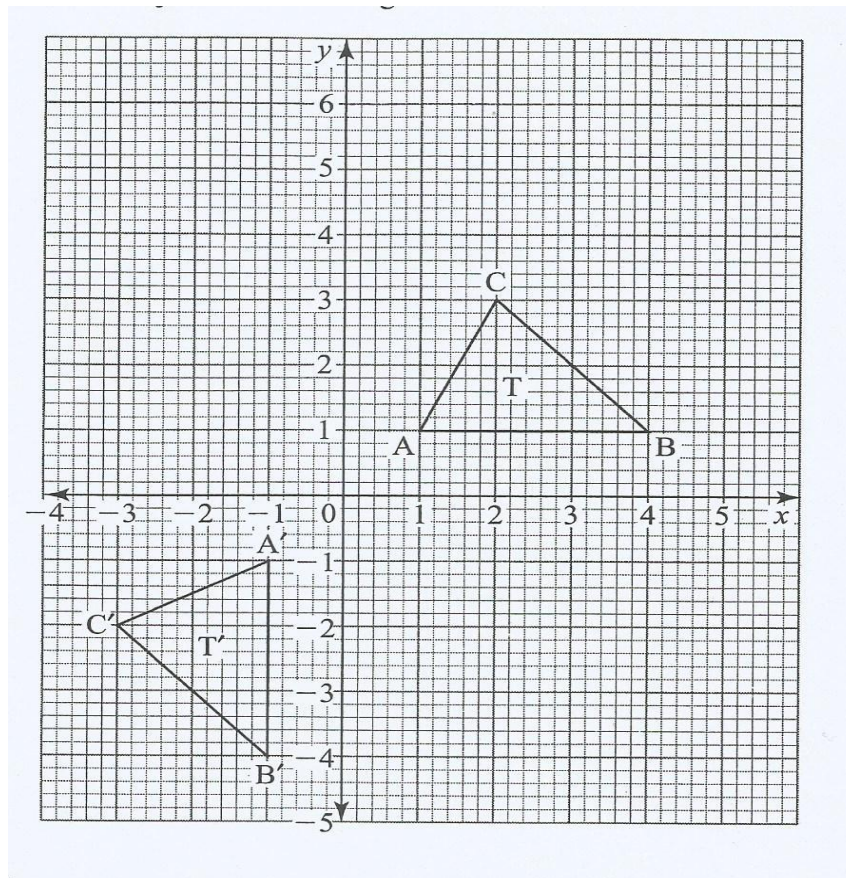
b) Using the scale drawing, determine

i) Compass bearing of R from P. (1 mark)

ii) The distance between R and S. (1 mark)

iii) The area of the region enclosed by the four pegs. (3 marks)

20. On the grid below, an object T and its image T' are drawn



- a) Find the equation of the mirror line that maps T onto T'. (1 mark)

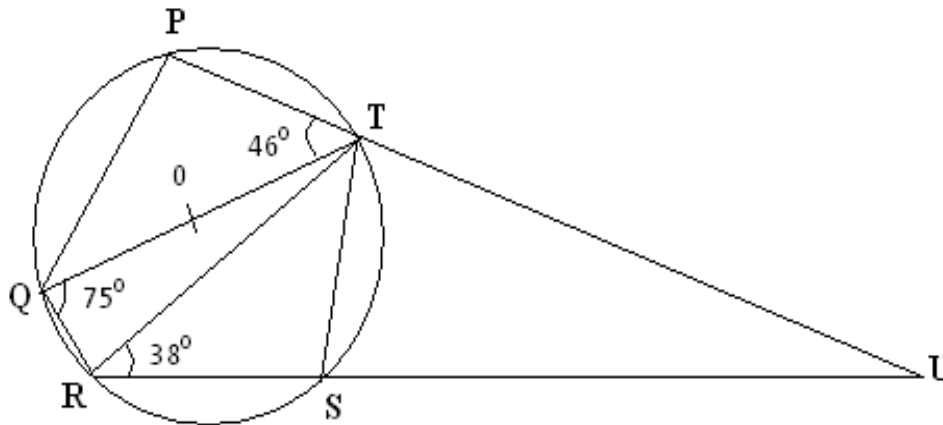
- b) i) T is mapped onto T' by positive quarter turn about (0,0). Draw T' and state its coordinates. (2 marks)

- ii) Describe a single transformation that maps T onto T'. (2 marks)

- c) T is mapped onto T' by an enlargement, centre (2, 0), scale factor -2. Draw T'. (2 marks)

- d) Given that the area of T is 12cm^2 , calculate the area of T'. (3 marks)

21. The figure below shows a circle centre O in which QOT is a diameter. Angle QTP = 46° , angle TQR = 75° and $\angle SRT = 38^\circ$, PTU and RSU are straight lines.



Determine the following, giving reason in each case.

- a) Angle RST (2 marks)

- b) Angle SUT (2 marks)

- c) Angle PST (2 marks)

- d) Obtuse angle ROT (2 marks)

- e) Angle SQT (2 marks)

22. The gradient of the curve $y = 2x^3 - 9x^2 + px - 1$ at $x = 4$ is 36.

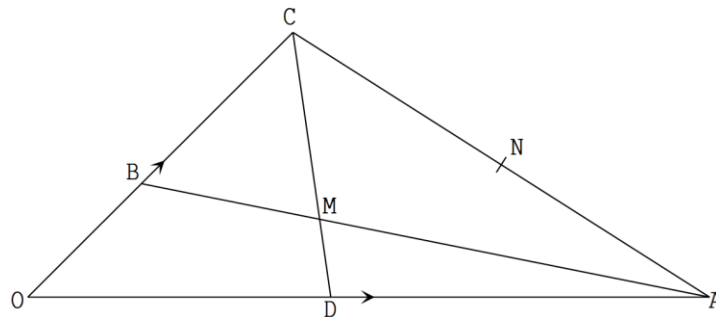
Find :

a) the value of p ; (3 marks)

b) The equation of the tangent to the curve at $x = 0.5$. (4 marks)

c) Find the coordinates of the turning points of the curve (3 marks)

23. In the figure below $\vec{OB} = \vec{b}$; $\vec{OC} = 3\vec{OB}$ and $\vec{OA} = \vec{a}$



a) Given that $\vec{OD} = \frac{1}{3}\vec{OA}$ and $\vec{AN} = \frac{1}{2}\vec{AC}$, \vec{CD} and \vec{AB} meet at M. Determine in terms of \vec{a} and \vec{b} .

i) \vec{AB} (1 mark)

ii) \vec{CD} (1 mark)

b) Given that $\vec{CM} = k\vec{CD}$ and $\vec{AM} = h\vec{AB}$. Determine the values of the scalars k and h . (5 marks)

c) Show that O, M and N are collinear. (3 marks)

24. The figure below shows a frequency polygon on distribution of ages within a certain family.



a) Generate a Frequency Distribution Table of the data above.

(3 marks)

Ages in years	Midpoints (x)	Frequency (f)

b) Use the data to estimate to one decimal place the:

i) mean of the data

(3 marks)

ii) median age. (2 marks)

iii) percentage of this family members who are atleast 25 years of age. (2 marks)

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