



# MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education  
PRE-MOCK EXAMINATIONS 2023

121/1

MATHEMATICS

Paper 1

April 2023 – TIME  $2\frac{1}{2}$  Hours

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

Class: ..... Candidate's Signature: ..... Date: ...../04/2023

### Instructions to Candidates

- Write your name, admission number and class 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 only **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

### 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	

**SECTION I** (50 marks)

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

1. Evaluate  $4.\dot{4}1 - 2.\dot{2}1$  (2 marks)

2. Given that  $\log_{10} 2 = 0.3010$  and  $\log_{10} 3 = 0.4771$  without using tables or calculator find  $\log 0.036$  correct to 4 significant figures. (3 marks)

3. Simplify  $\frac{ax - 2a - 5x + 10}{8 - 2x^2}$ . (3 marks)

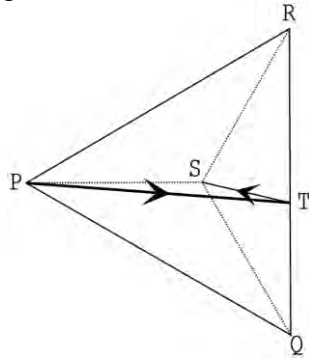
4. Solve the equation  $\sin(150 \div x)^\circ = \cos(12x)^\circ$  for which  $x$  is acute. (3 marks)

5. Under an enlargement, the image of the points  $A(3,1)$  and  $B(1,2)$  are  $A'(3,7)$  and  $B'(7,5)$ . Find the centre and scale factor of enlargement. (4 marks)

6. A shopkeeper bought a bag of sugar. He intends to repack the sugar in 40 g, 250 g and 750 g. Determine the least mass in grams of sugar that was in the bag. (3 marks)

7. Solve for  $x$  and  $y$  in  $3^{3y} \div 3^{2x} = 6561$  and  $2^{2x} \times 2^{3y} = 1$  . (4 marks)

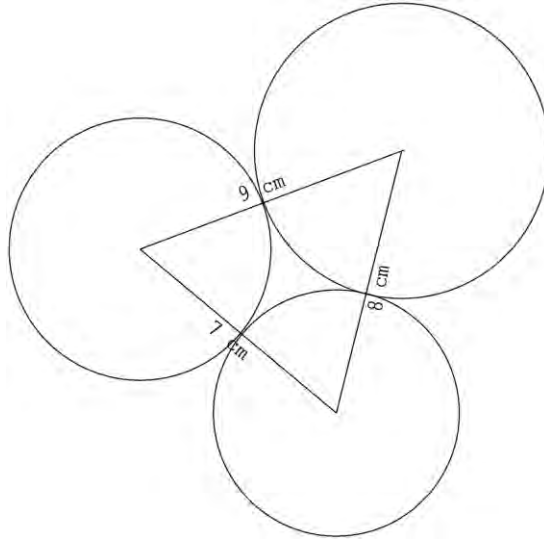
8. The figure below shows a regular tetrahedron PQRS.



Draw its net and measure the length of the straight path of PS through the midpoint T over the edge QR.

(3 marks)

9. The figure below shows three circles touching each other externally.



If the centres of the circle form a triangle with sides of length 9 cm, 8 cm and 7 cm, calculate the radii of each the circles. (3 marks)

10. A Kenyan company received **M** Us dollars. The money was converted into Kenya Shillings in a bank which buys and sells foreign currencies as shown below.

	<i>Buying (Kshs)</i>	<i>Selling (Kshs)</i>
<i>1 Sterling Pound</i>	<i>125.78</i>	<i>126.64</i>
<i>1 US Dollar</i>	<i>75.66</i>	<i>75.86</i>

- a) If the company received Kshs.15, 132, 000, calculate the amount, **M** Us Dollars. (2 marks)
- b) The company exchanged the above Kenyan shillings into Sterling pounds to buy a car in Britain. Calculate the cost of the car to the nearest Sterling Pound. (2 marks)

11. A bus travelling at an average speed of  $x$  km/h left station at 8.15 am. A car, travelling at an average speed of 80km/h left the same station at 9.00 am and caught up with the bus at 10.45 am. Find the value of  $x$  . (3 marks)
12. The position vector of points A and B are  $-10i - 6j + 9k$  and  $-5i + k$  respectively. Calculate  $|\overline{AB}|$  leaving your answer in surd form. (3 marks)
13. Solve the inequality  $5 - 2x < \frac{1}{2}x < \frac{x+2}{3}$  and represent the solution on a number line (3 marks)

14. Use tables of reciprocals and square roots to evaluate  $\frac{3}{0.521} + \sqrt{0.4036}$  (3 marks)

15. Two farmers Salat and Ahmed share a grazing field. Salat puts 120 cows for 18 days and Ahmed puts 150 cows for 16 days. If the rented land was charged Kshs.8 550, how much should Ahmed pay if they share proportionally? (3 marks)

16. Construct triangle XYZ in which XY = 4.5 cm, YZ = 6 cm and XZ = 5.5 cm. Construct a circle that touch ZY, XY and XZ produced and also opposite to  $\angle$  YXZ. (3 marks)

**SECTION II (50 marks)**

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

17. A salesman dealing in mattresses earns a basic salary and commission as follows:

	Commission
For sales up to Ksh 150 000	0%
For sales above Ksh 150 000	
First Ksh 85 000	3%
Next Ksh 85 000	4%
Any amount above Ksh 320 000	5%

(a) In the month of January 2023, the salesman earned a basic salary of Ksh 45 000 and he sold 110 mattresses at Ksh 5 000 each. Calculate:

(i) His total sales in the month of January 2023. (1 mark)

(ii) His total earnings that month. (3 marks)

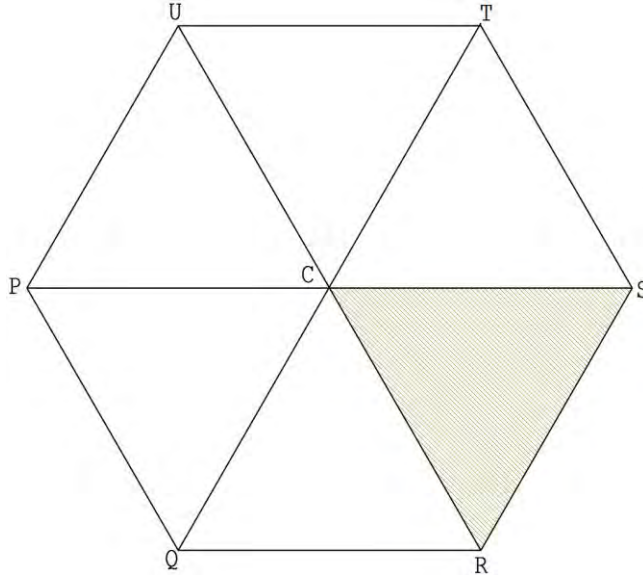
(b) In the month that followed, his basic salary was decreased by 10%. If he received a total earning of Ksh 47 450 in that month, calculate:

(i) Total sales that month. (4 marks)

(ii) The number of mattresses sold in that month. (2 marks)

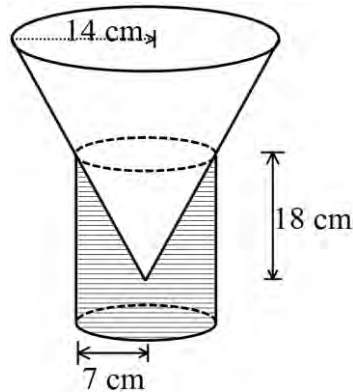


18. In the figure below, PQRSTU is a regular hexagon.



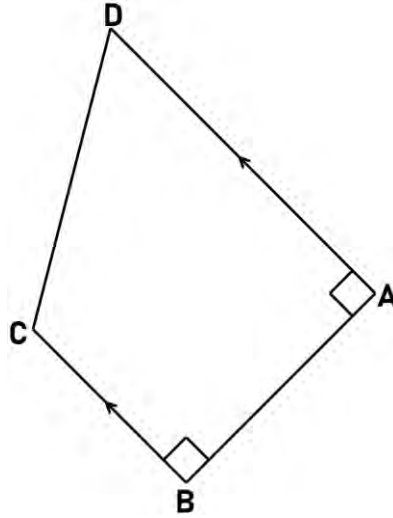
- (a) Describe fully:
- (i) a reflection that maps  $\triangle SCR$  onto  $\triangle SCT$ . (1 mark)
- (ii) an enlargement that maps  $\triangle SCR$  on  $\triangle PCU$ . (2 marks)
- (iii) a rotation that maps  $\triangle SCR$  to  $\triangle UCT$ . (3 marks)
- (b) The  $\triangle PQC$  is reflected on the line RU. The image of  $\triangle PQC$  under the reflection is then rotated through an angle  $-120^\circ$  about point C. Determine the images of P and Q:
- (i) Under the reflection. (2 marks)
- (ii) After the two successive transformations. (2 marks)

19. A cylindrical tin of radius 7 cm contains water to a height of 19 cm. When a conical solid of radius 14 cm is fitted into the cylindrical tin to a depth of 18 cm as shown in the figure below, the water completely fills the space between the cylindrical tin and part of the cone inside the tin.



- (a) Taking  $\pi$  to be  $\frac{22}{7}$ , calculate correct to one decimal place:
- (i) The volume of part of the cone that is not in contact with water. (3 marks)
- (ii) The surface area of part of the cone that is not in contact with water. (4 marks)
- (b) Calculate the height of the cylindrical tin. (3 marks)

20. The figure below shows a trapezium on a Cartesian plane with the co-ordinates  $A(p,3)$ ,  $B(2,5)$ ,  $C(x,y)$  and  $D(5,-2)$ . Line AD is parallel to BC.



Given that the line AB makes an angle of  $45^\circ$  with the positive  $x$ -axis

- (a) Determine the equation of line AB in the form  $y = mx + c$  (2 marks)

- (b) State the value of  $p$  in the coordinates of point A (2 marks)

- (c) Find the equation of BC in the form  $ax + by = c$  (2 marks)

- (d) Given that the gradient of  $CD = -5$ . Find its equation hence coordinates of point C. (4 marks)

21. Two aeroplanes  $T_1$  and  $T_2$  leave airport A for airports B and D respectively. Aeroplane  $T_1$  flies on a bearing  $050^\circ$  at an average speed of 300 km/hr for 40 minutes. Aeroplane  $T_2$  flies on a bearing  $120^\circ$  at an average speed of 360 km/hr for 45 minutes. An airport C is directly south of B and east of A.

(a) Calculate the distance between:

(i) Airports A and B. (1 mark)

(ii) Airports A and D. (1 mark)

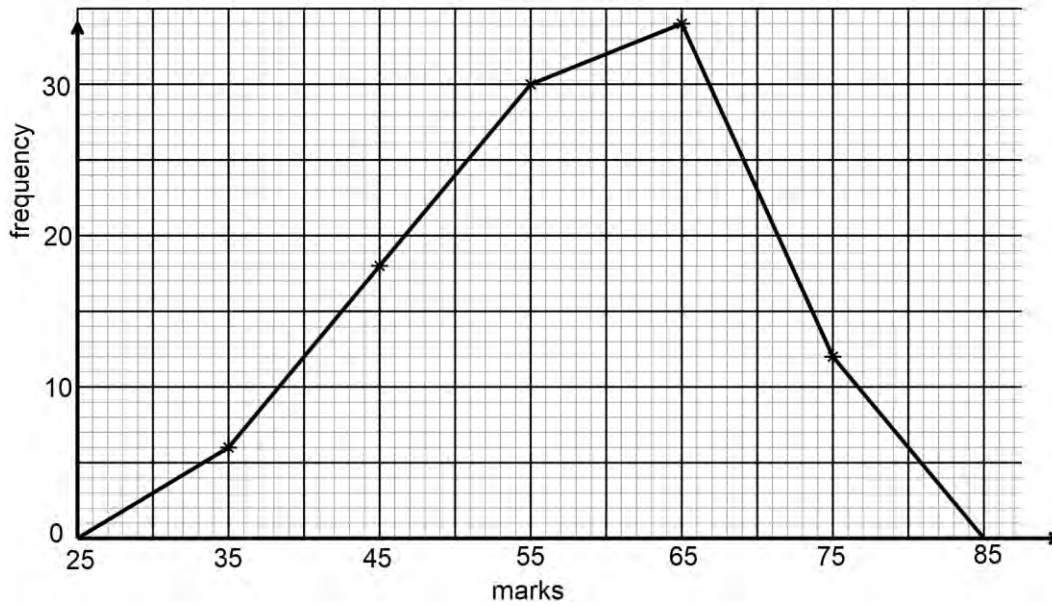
(b) Calculate the distance correct to four significant figures between:

(i) Airports A and C. (2 marks)

(ii) Airports C and D. (3 marks)

(c) Calculate the true bearing to the nearest degree of airport D from C. (3 marks)

22. The figure below shows a frequency polygon representing the scores of Form 4 students in a Mathematics Test.



a) Generate the Frequency Distribution of the data under the columns given below in the table below.

(5 marks)

Marks	Frequency (f)	Mid points ( $x$ )	$fx$	$c.f.$

b) State the modal class.

(1 mark)

c) Estimate

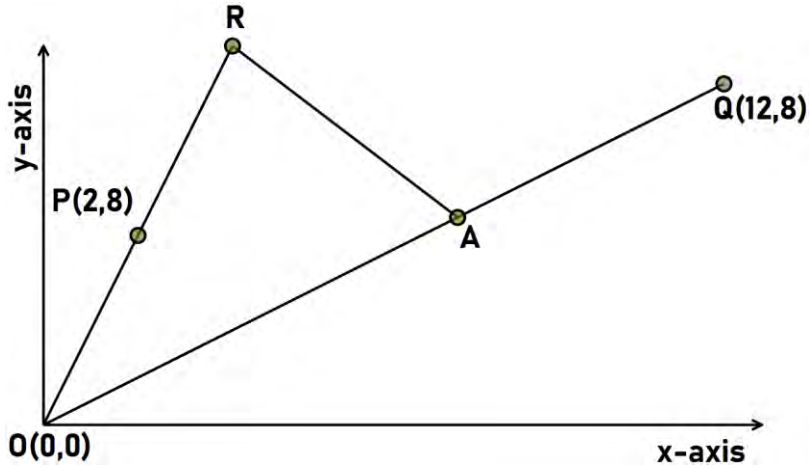
(i) the mean mark

(2 marks)

(ii) the median mark

(2 marks)

23. In the diagram below, the coordinates of points O, P and Q are (0, 0), (2, 8) and (12, 8) respectively. A is a point on  $\overline{OQ}$  such that  $2\overline{OA} = \overline{OQ}$ . Line  $\mathbf{OP}$  is produced to R is such as  $\overline{OR} = 3\overline{OP}$ .

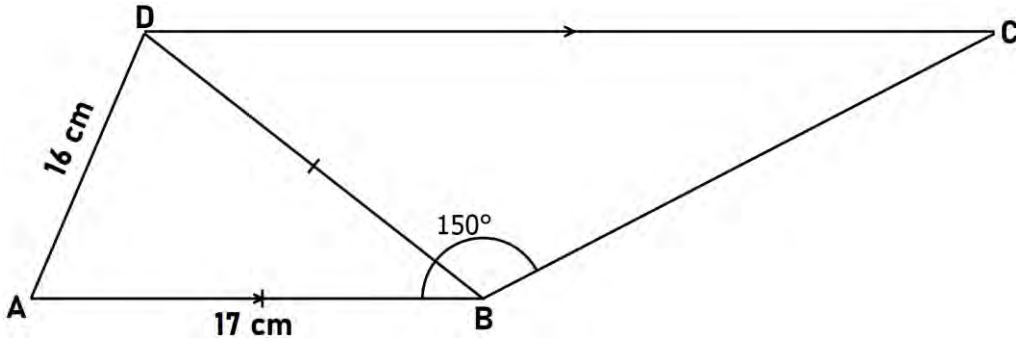


- a) Find vector  $\overline{RA}$ . (3 marks)

- b) Given that point L is on  $\overline{PQ}$  such that  $\overline{PL} : \overline{LQ} = 2 : 3$ , find vector  $\overline{RL}$ . (4 marks)

- c) Show that R, L and A are collinear. (3 marks)

24. In the figure below, ABCD is a trapezium in which  $AB = 17$  cm,  $AD = 16$  cm and angle  $ABC = 150^\circ$ .  $AB$  is parallel to  $DC$  and  $AB = BD$ .



- (a) Calculate the area of triangle ABD (2 marks)

- (b) Calculate correct to two decimal places:

- (i) The length BC (2 marks)

- (ii) The length AC (3 marks)

- (iii) The size of angle ACD (3 marks)