MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education

MOCK EXAMINATIONS 2021

121/1 **MATHEMATICS** **Paper 1**

December 2021 – TIME 2 $\frac{1}{2}$ Hours

Name: ……Adm No: ……

Class: ……Candidate's Signature: …….. Date: ……../12/2021.

Instructions to Candidates

(a) Write your name, admission number and class 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** the questions in **Section I** and any **five** questions from **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 **16** 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

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 the section in the space provided:

1. Calculate the total value of digit 6 in the number 435.609 hence state it in words. (2 marks)

2. In a covid-19 vaccination centre, teachers may receive their jabs from either of the two doctors stationed at the two tents. On an average, one doctor takes 2 minutes while the other doctor takes 3 minutes to serve one teacher. If the two doctors start to serve the teachers at the same time, find the shortest time it takes to vaccinate a total of 300 teachers. (3 marks)

3. Evaluate $\frac{2\frac{1}{2} of\ 1\frac{3}{4} - 5\frac{1}{4}}{1\frac{2}{5} + 2(1\frac{1}{4} - 2\frac{3}{4})}$. (3 marks)

4. Given that $\frac{2}{3}x = \frac{1}{2}$ and $\frac{3}{4}y = \frac{3}{2}$ calculate the value $\frac{x+y}{xy}$. (3 marks)

5. A car dealer charges 10% commission for selling a car. If he received a commission of Ksh.27,500 for selling a Toyota Mark X, calculate the amount of money that the owner received from the sale of his car if the dealer added an extra charges of 5 %. (3 marks)

6. Find all the integral values of x which satisfy the inequality (3 marks)
   $3(1 + x) < 5x - 14 < x + 46$

7. Use Table of logarithms to evaluate $\sqrt[3]{\frac{0.921\ x\ 0.00739}{0.023}}$. (4 marks)

8. Calculate the value of p given that $\sin(3p-20)^{\circ} - \cos(p+30)^{\circ} = 0$. (2 marks)

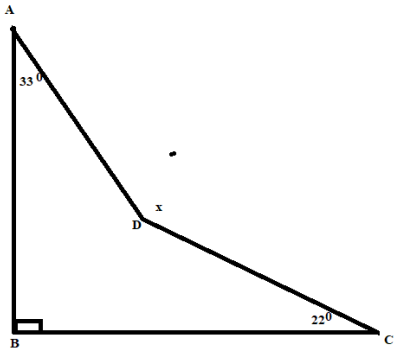
9. A rhombic cardboard whose diagonals are of lengths 16cm and 12cm is to be surrounded by a golden chain. Calculate the length of the chain enough to surround it just once. (3 marks)

10. Solve for c in the equation $\frac{2+2^{c-4}}{5} = 26$. (3 marks)

11. Find the value of k given that $2k - 1$ is the mean of $3k + 2$ and $4k + 1$. (3 marks)

12. The co-ordinates of P and Q are (6, 5) and (2, 3) respectively. Find to one decimal place magnitude of 2**PQ.** (3 marks)

13. The figure below shows quadrilateral ABCD in which angle ABC=90°, BAD=33° and BCD=22 ° .

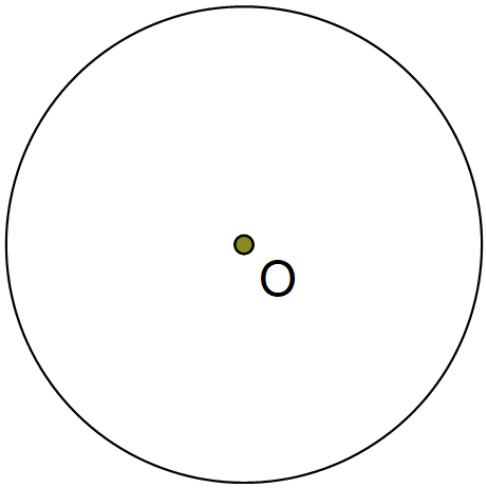


Calculate the size of the obtuse angle ADC=x. (3 marks)

14. A group of x Form 4 students decided to contribute equally to raise a total of sh. 810 to buy a birthday cake for the School President. Three of the x students were sent home for fees before submitting their contribution. As a result, each of the remaining students had to contribute an extra of sh. 9 to realize the same amount. Form an equation in x and hence find the number of students who actually contributed towards the birthday cake. (4 marks)

15. A measuring cylinder of base radius 5cm contains water whose level reads 6cm high. A spherical object is immersed in the water and the new level reads 10cm. Calculate the radius of the spherical object. (4 marks)

16. The figure below shows a circle of centre O. The vertices of a regular hexagon ABCDEF lies directly on its circumference.



Construct the hexagon ABCDEF hence calculate the area of the hexagon. (4 marks)

Section II (50 Marks)

Answer ONLY FIVE questions in the section in the space provided:

17. In a certain meeting, there were 95 men in attendance. Fifty more women than men and twice as many children as men also attended.

(a) Determine the number of people in meeting. (2 marks)

(b) Find the percentage of children in attendance, correct to three significant figures. (2 marks)

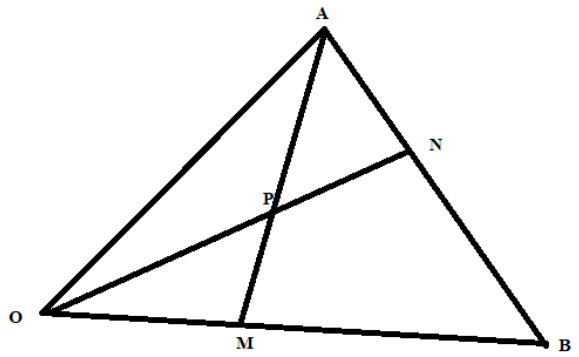
(c) A hall for the meeting was fitted with benches that could accommodate either 10 children or 7 adults per bench. Find the number of benches:

i) used by the children. (2 marks)

ii) completely filled by the adults. (2 marks)

iii) adults who would fill the unoccupied space. (2 marks)

18. The figure below shows triangle OAB in which **OA** =***a*** and **OB**=***b***. M and N are points on OB and AB respectively such that **OM**=$\frac{1}{3}$**OB** and 5**AN**=2**AB**. Lines AM and ON meets at P such that **OP** =$\frac{5}{9}$ **ON**.



(a) Express the following vectors in terms of **a** and **b**

i) $\overline{AB}$ (1 mark)

ii) $\overline{ON}$ (2 marks)

iii) $\overline{AM}$ (1 mark)

(b) Express $\overline{AP}$ and $\overline{PM}$ in terms of ***a*** and ***b*** and hence show the points A, P and M are collinear.

(5 marks)

(c) State the ratio AP: PM. (1 mark)

19. A particle moving along a straight line covers a distance of 5 meters in time t seconds from a fixed point O on the line where $S= t^3- 6t^2 + 8t – 4$.

Find;

(a) the velocity of the particle when t=5. (3 marks)

(b) the acceleration where t=5 seconds. (2 marks)

(c) the time when the velocity of the particle is constant. (2 marks)

(d) the time when the particle will be momentarily at rest. (3 marks)

20. Four towns A,B,C and D are such that B is on a bearing of 247° and 6km from A. C is due SE and 4.8km from B. D is to the south of A and the bearing of C from D is S44°W

(a) Make a scale drawing showing the relative positions of A,B, C and D using the scale 1cm represents 1 kilometre. (4 marks)

(b) Use your drawing to determine

(i) The bearing of A from C. (1 mark)

(ii) The distance between C and D (1 mark)

(iii) How far D is east of B (1 mark)

(c) The average speed of a cyclist from C to A if he takes 30 minutes between A and D and 20 minutes between D and A. (3 marks)

21. A line L_1 whose equation is $6x+2y+5k=0$ passes through the point $(-3,-1)$ and is perpendicular to L_2 whose equation is $2px+9y=10$. Find:

(a) the values of k and p. (4 marks)

(b) the equation of line L_3 which is parallel to L_2 in the form $ax+by=c$. (3 marks)

(c) the obtuse angle with which line L_2 makes with x axis. (3 marks)

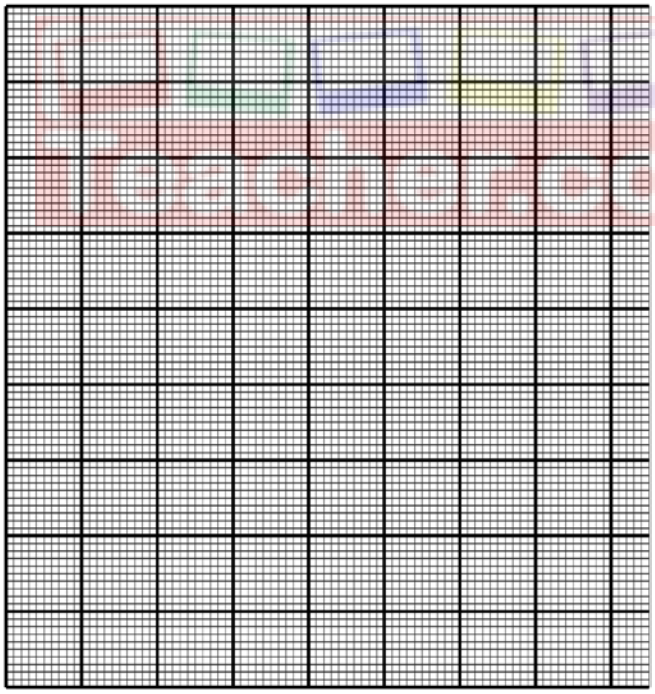
22. The table shows the marks obtained by 40 candidates in an examination

marks	5 – 14	15 – 24	25 – 34	35– 44	45 – 54
Frequency	2	12	7	15	*x*

(a) Calculate the value of *x*. (2 marks)

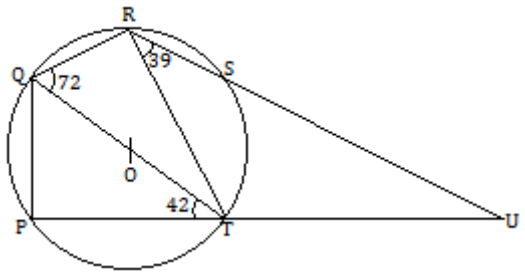
(b) Estimate the median mark. (3 marks)

(c) On the grid provided below draw a histogram to represent the data. (3 marks)



(d) If the pass mark was 40 marks and above, use the histogram to get the number of students that passed. (2 marks)

23. In the figure below, **QOT** is a diameter, **∠QTP**=42^0**, ∠TQR** = 72^0 and ∠**SRT** =39^0: **RSU** and **PTU** are straight lines.



Calculate the following, giving reasons:

(a) $\angle RST$ (2 marks)

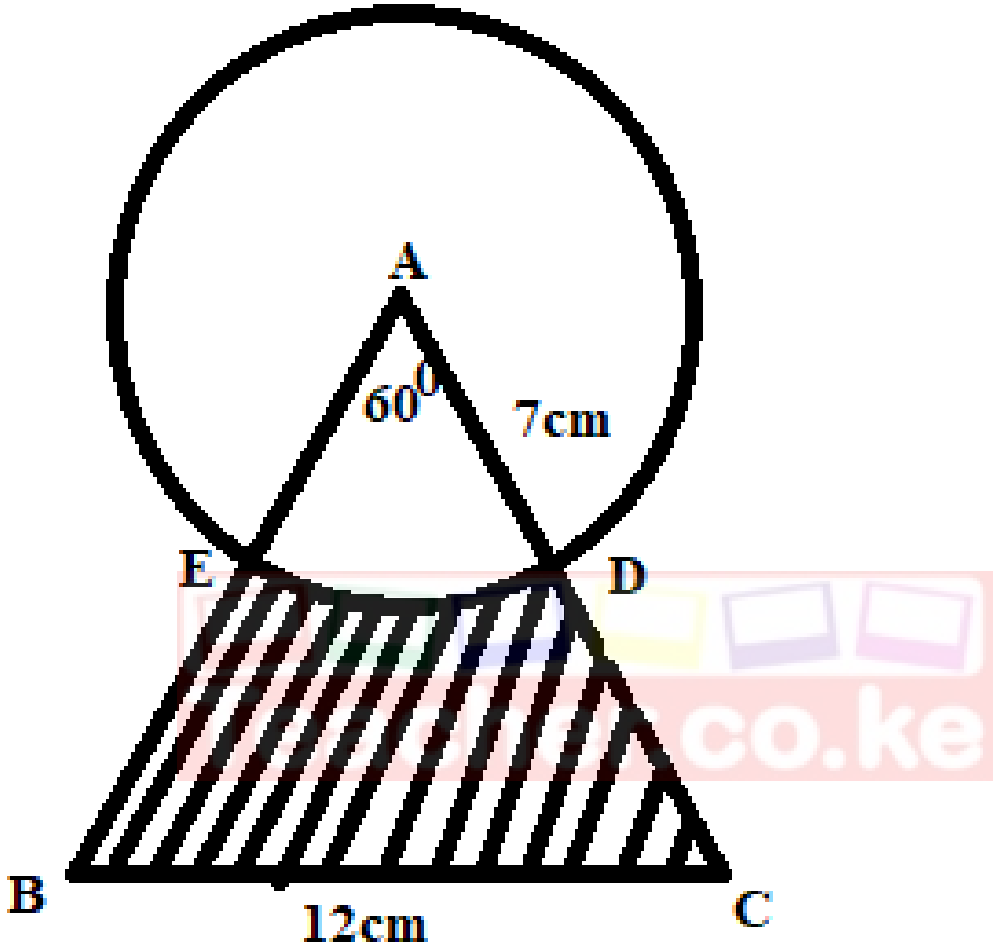
(b) $\angle SUT$ (2 marks)

(c) $\angle PST$ (2 marks)

(d) Obtuse $\angle ROT$ (2 marks)

(e) $\angle SQT$ (2 marks)

24. The figure below shows a cross sectional area of an emblem made of circular ring of centre A and radius AD=7cm adorned with an extension of an isosceles triangular plinth ABC whose base BC=12cm.



Calculate to 2 decimal places:

(a) The length of the chord ED. (2 marks)

(b) The area of the shaded region. (4 marks)

(c) If the shaded region is made up of a different metal of density $1025kgm^{-3}$ and the emblem is 2.5cm wide, calculate the mass, in grammes, of that kind of metal required for making 100 such emblems. (4 marks)

THIS IS THE LAST PRINTED PAGE