MARANDA HIGH SCHOOL

Kenya Certificate Of Secondary Education

THE 2024 MOCK EXAMINATION

121/1 MATHEMATICS PAPER 1

June, 2024 TIME: 2½ Hrs

Name: …… Admission No: ……

Stream: …….. Signature: ……..

121/1 - MATHEMATICS
Wednesday, 5th June, 2024
Morning
7.00am-9.30am

Instructions

Instructions to candidates

(a) Write your name, admission number and stream 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 only **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.***
*(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

Grand Total

SECTION I (50 marks)

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

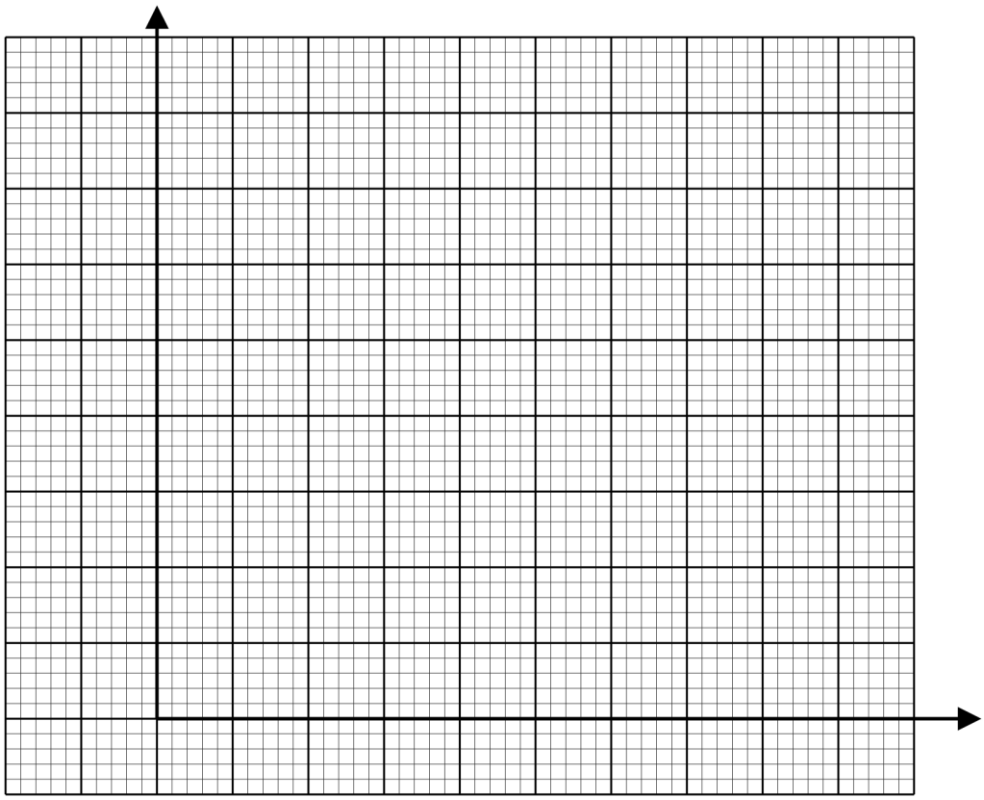
1. Solve for a in the equation $3\frac{a}{5} - 4\frac{a}{20} = 2$. **(3 marks)**

2. At Kona-Samaki Secondary School $\frac{3}{10}$ of the students are boys. On a certain day $\frac{5}{6}$ of the boys were present and $\frac{2}{5}$ of the girls were absent, if the total number of students absent on that day were 99 calculate the population of students in the school. **(3 marks)**

3. Calculate $m = \sqrt[3]{9a}$ without using Calculators or Mathematical Tables given that $\sqrt{a} = 8\sqrt{3}$. **(3 marks)**

4. From a viewing tower, 30 metres above the ground, the angle of depression of an object on the ground is 30° and the angle of elevation of an aircraft vertically above the object is 42°. Calculate the height of the aircraft above the tower to the nearest millimeter. **(3 marks)**

5. On the grid provided draw the region bounded by: $y - 2x \leq 1,\ x + y < 7\ and\ y \geq 1$ using a scale of 1cm to represent 1 unit on both axes. **(3 marks)**



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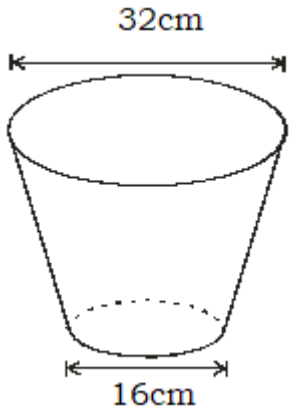
6. The ratio of the current ages of John and Kelly is 4:5. Five years ago, the ratio of their ages was 7:9. Calculate their current ages in years. **(3 marks)**

7. The figure below shows a frustum container with base diameter 16cm and top diameter 32cm. The slant height of the frustum is 36cm as shown below. The container 80 percent full of water.



Calculate the volume of the water in the container to the nearest decilitre. **(4 marks)**

8. Solve for k in the equation $\left(\frac{20}{12}\right)^{(7k-5)} = \left(\frac{36}{100}\right)^{(k-1)}$. **(3 marks)**

9. Given that x is an acute angle and sin $(x - 20)° = \cos(3x - 50)°$ find the value of x in degrees.

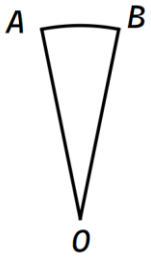
(2 marks)

10. A straight line whose equation is $4y + 3x = 12$ is perpendicular to line QR. Determine the obtuse angle α°, to one decimal place, which line QR makes with x-axis. **(3 marks)**

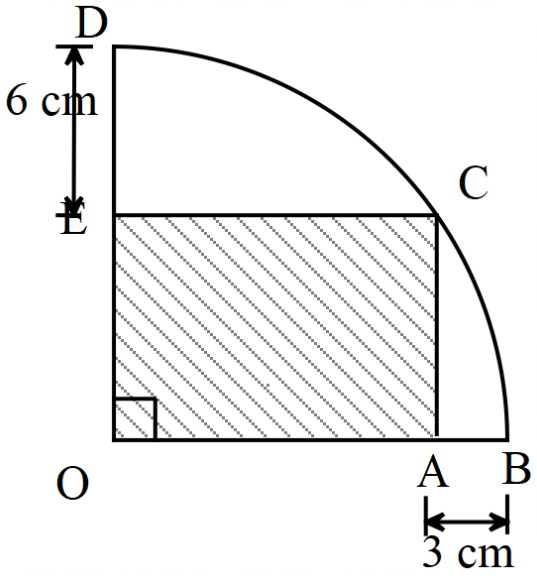
11. Determine the value of t given that points $P(-6,-3), Q(-2,-1)$ and $R(6,-t)$ are collinear**. (4 marks)**

12. Calculate the square of the length of the side of an equilateral triangular card whose area is 81 cm^2 leaving your answer in the form $b\sqrt{c}$. **(3 marks)**

13. In the figure below triangle ABO represents part of a county government badge. The badge has a symmetry of order 3 about O. Complete the figure to show the badge**.** **(3 marks)**

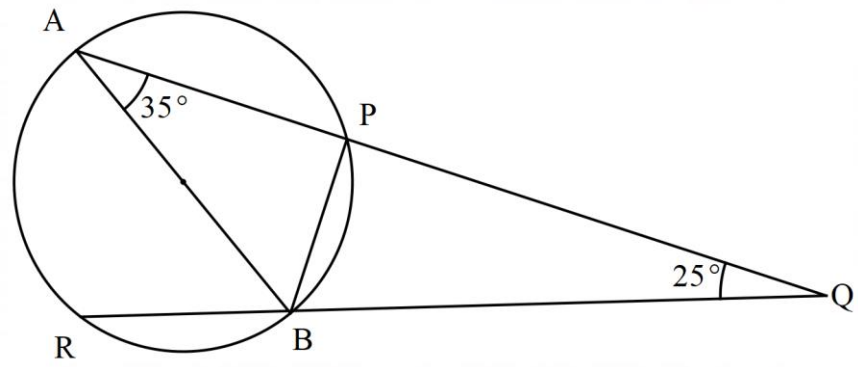


14. The figure below shows rectangle OACE inscribed in a quarter circle centre O.



Calculate the area of the shaded region. **(4 marks)**

15. The figure below shows a circle with diameter AB. AP and RB are its chords which intersect externally at point Q.



Calculate the size of angle PBR. **(3 marks)**

16. Use the trapezium rule to estimate the area under the curve $y = x^2 + x - 6$ over the interval $0 \leq x \leq 8$ using 4 trapezia. **(3 marks)**

SECTION II (50 marks)

*Answer any **five** questions from this section in the spaces provided:*

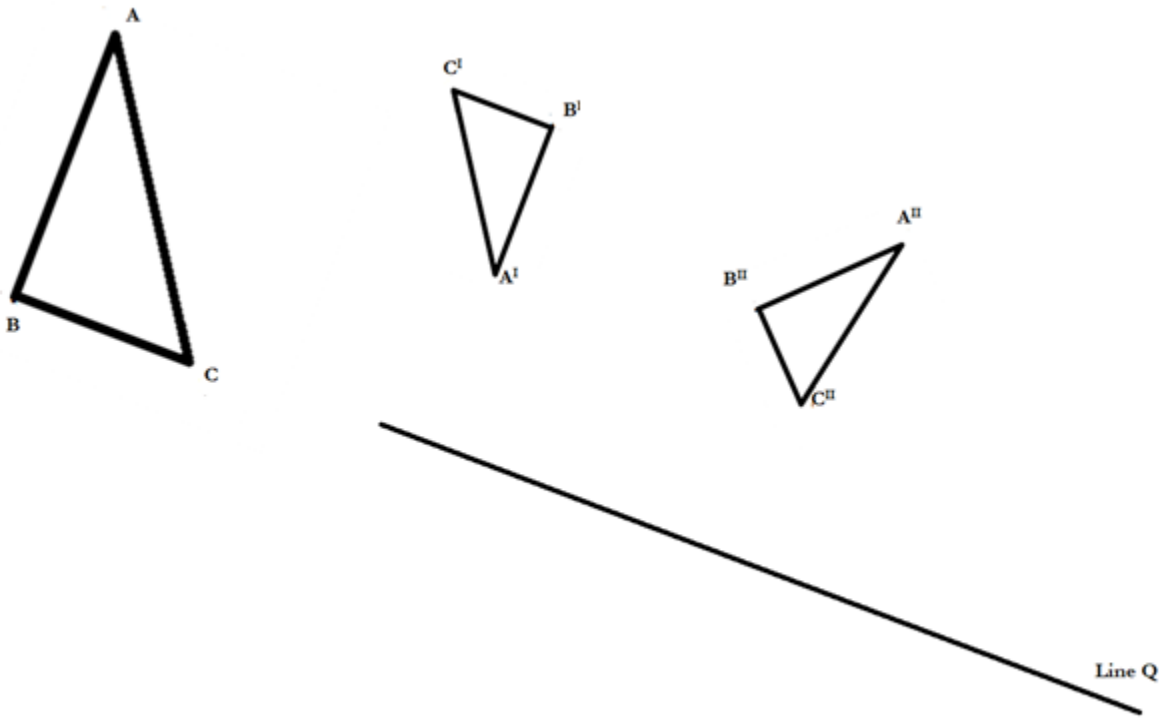
17. The marked price of a piece of metal rod is Kshs. 1250 from Mali-Bora Metal Suppliers Limited. The supplier however have put a condition that discounts can only be allowed to customers who purchase more than 50 pieces of the metal rod. Customers enjoyed a 5% discount on the over purchase of the first 10 rods and thereafter 8%.

Calculate the:

a) percentage profit the Supplier received from the sale of 62 metal rods given that the Factory supplied them at Kshs. 1078 per rod. **(5 marks)**

b) number of rods received by a customer who paid Kshs.168,675 under the same terms. **(5 marks)**

18. The triangle $A^IB^IC^I$ is the image of triangle ABC under a transformation enlargement of centre X and scale factor P. On the other hand $A^{II}B^{II}C^{I\,I}$ is the image of $A^IB^IC^I$ under rotation whose centre of rotation is Y and angle of rotation is α°. $A^{II}B^{II}C^{I\,I}$ is further reflected on line Q to give triangle $A^{III}B^{\,III}C^{III}$.



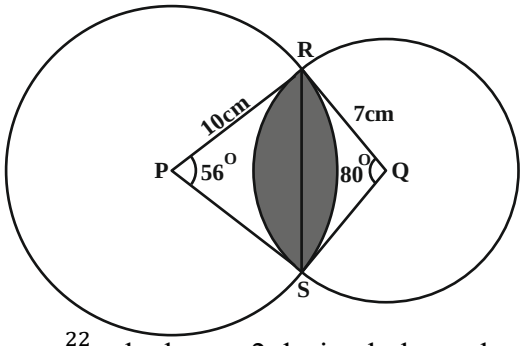
By construction:

a) locate centre X hence calculate, to one decimal place, the scale factor of enlargement P. **(4 marks)**

b) locate centre Y hence measure the angle of rotation α°. **(3 marks)**

c) draw $A^{III}B^{\,III}C^{III}$ the image of $A^{II}B^{\,II}C^{II}$ under reflection on line Q. **(3 marks)**

19. The figure below shows two circles centres P and Q of radii 10cm and 7cm respectively. The two circles intersect at R and S so that they have a common chord RS. Given that angle RPS = 56^0 and angle RQS = 80^0.



Taking $\pi = \frac{22}{7}$ calculate to 2 decimal places the area of the:

a) sectors RSP and RSQ **(4 marks)**

b) triangles RPS and RQS **(4 marks)**

c) shaded region. **(2 marks)**

20. Madam Pamela used to buy a certain number of bottles of soda for her class during bashes for Ksh. 3000. However when the prices of each bottle of soda went up by Ksh.10 she had to add money for ten more bottles on top of their usual budget.

a) Taking x as the original number of bottles of soda bought from the original budget, write an expression for the:

i) price of a bottle of soda before the increase in price. **(1 mark)**

ii) price of a bottle of soda after the increase in price. **(1 mark)**

b) Calculate:

i) number of bottles of soda purchased by Madam Pamela. **(4 marks)**

ii) the percentage increase in the price of a bottle of soda. **(3 marks)**

iii) the number of learners in the class if each took two bottles of soda. **(1 mark)**

21. The equation of a curve is given by $y = \frac{1}{3}x^3 - \frac{1}{2}x^2 - 12x + \frac{2}{3}$.

a) Determine the :

i) equation of the normal to the curve $y = \frac{1}{3}x^3 - \frac{1}{2}x^2 - 12x + \frac{2}{3}$ at $x = -1$. **(3 marks)**

ii) coordinates of the stationary points of the curve $y = \frac{1}{3}x^3 - \frac{1}{2}x^2 - 12x + \frac{2}{3}$. **(3 marks)**

iii) nature of each stationary point in (ii) above. **(2 marks)**

b) Hence sketch the curve $y = \frac{1}{3}x^3 - \frac{1}{2}x^2 - 12x + \frac{2}{3}$ showing clearly the *y*-intercept and the stationary points. **(2 marks)**

22. Rafiki bus left Nairobi at 8:00am and traveled towards Mombasa at an average speed of 80km/hr. At 8:30am Upendo Bus left Mombasa towards Nairobi at an average speed of 120km/hr. Given that the distance between Nairobi and Mombasa is 400km; determine:

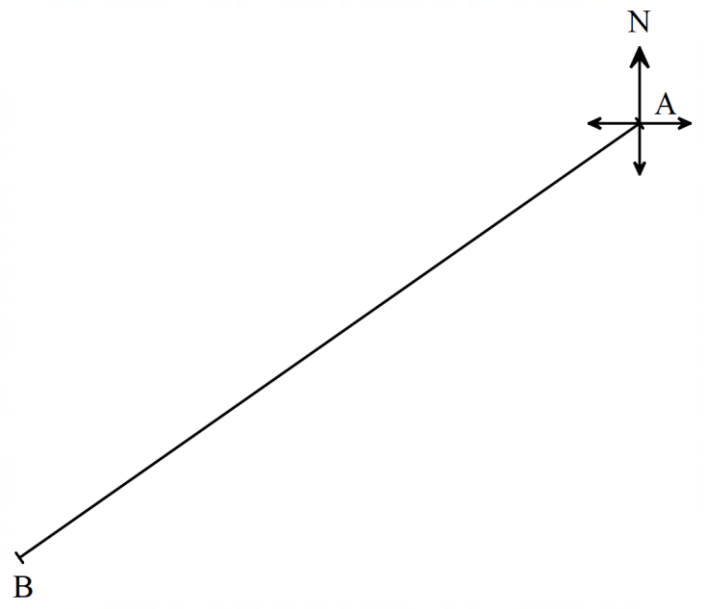
a) time Upendo Bus arrived in Nairobi. **(2 marks)**

b) time the two buses met. **(3 marks)**

c) distance from Nairobi to the point where the two buses met. **(2 marks)**

d) speed in km/hr at which the taxi driver must drive from the airport 10km away ferrying an Investigating Officer who boarded a plane travelling at 300km/hr from Mombasa at 10:10am to intercept a suspect at the terminus of Upendo Bus Service just as the bus arrive given that the taxi driver also require 10 minutes for changeover and braking. **(3 marks)**

23. The scale diagram below shows the relative positions of towns A and B which are 80 kilometres apart.



a) Determine the scale used in drawing the diagram in the form $1:x$ hence state the compass bearing of point A from B. **(2 marks)**

b) Locate another town C on the bearing $150^0$from A and 085^0 from B hence state the distance between town B and C. **(3 marks)**

c) Locate and label a Surveillance Post K which is equidistant from the three towns and hence use it to construct a ring road that passes through the three towns such that the road is always equidistant from the Post K. **(3 marks)**

d) Calculate the length of the ring road. **(2 marks)**

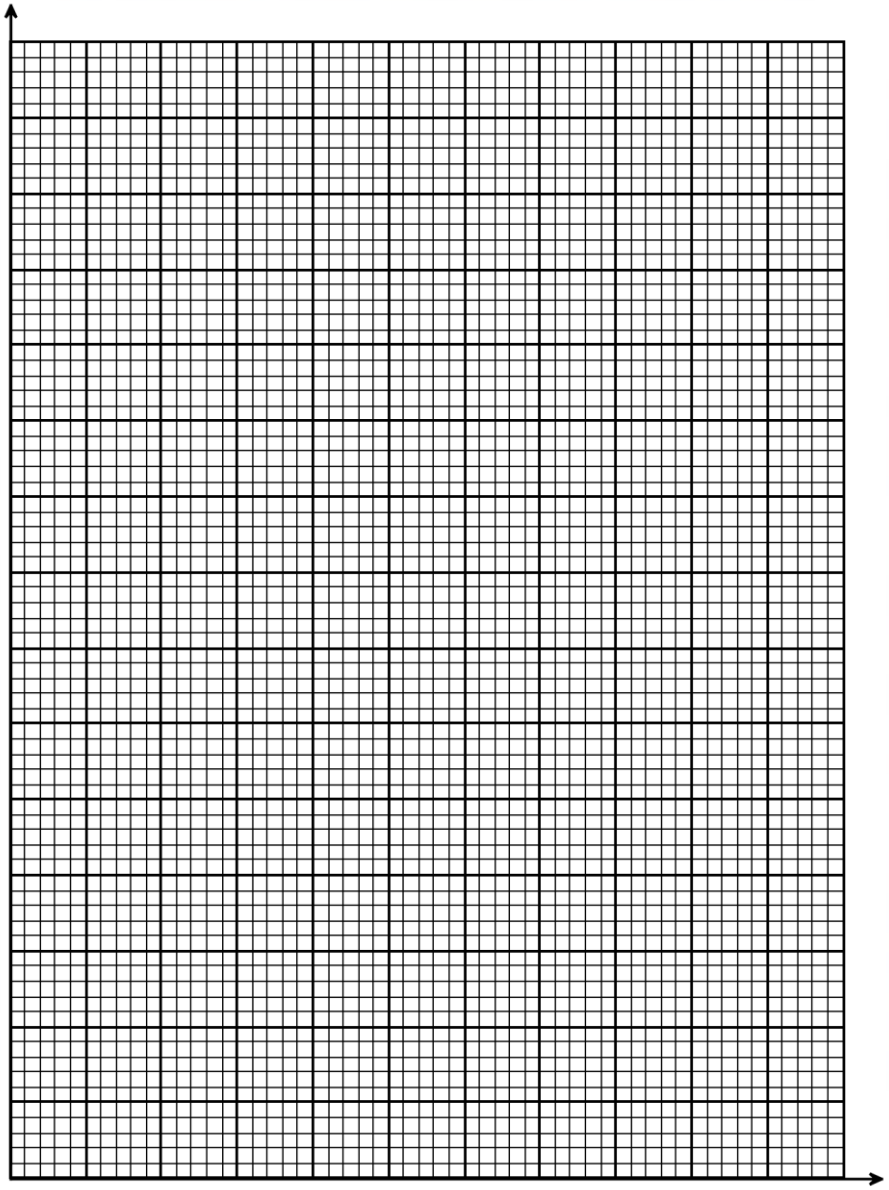
24. The Table below shows marks obtained by 60 students in a Mathematics Exams.

Marks	**11-20**	**21-30**	**31-40**	**41-50**	**51-60**	**61-70**	**71-80**	**81-90**
Number of learners	3	9	q	14	10	6	r	2

a) Calculate the values of q and r given that the median mark is 45.5. **(4 marks)**

b) Determine the mean mark for the test to two decimal places. **(3 marks)**

c) On the grid provided draw a frequency polygon representing the data using a scale 1cm to represent 10 marks in x-axis and 1cm to represent 1 student in the y-axis. **(3 marks)**



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