

NAME _____ CLASS _____

DATE _____

SIGNATURE _____

MATHEMATICS 121/1
FORM FOUR
1ST TERM 2016
2 ½ HRS.

Kenya Certificate of Secondary Education
MATHEMATICS 121/1
FORM FOUR 1ST TERM EXAMINATION 2016

Instructions

- Write your name and your class in spaces provided
- The paper contains two section. Section I and Section II
- Answer all the questions in section I and any five questions from section II
- All answers and working must be written on the question paper in the spaces provided below each question .
- Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
- KNEC Mathematical tables may be used. Except where stated otherwise.

For Examiner's Use Only

Questions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Marks																

Questions	17	18	19	20	21	22	23	24
Marks								

Grand
Total

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This paper consists of 14 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

5. The point P, Q and R have the coordinates (2,4), (7,-2) and (6,2) Respectively. Find the equation of the line L which is perpendicular to PQ and passes through the midpoint of PR. (3marks)

6. The sides of a triangle have column vector $\vec{AB} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$ and $\vec{BC} = \begin{pmatrix} 4 \\ 4 \end{pmatrix}$. Write down the column vector of CA hence find its magnitude leaving your answer in 4S.F (3marks)

7. Find the range of values of x if $x + 21 > 15 - 2x > x + 12$. (3marks)

8. The cost of buying a certain car outside Kenya is US\$ 4,800. You intend to buy one such car through an agent who deals in Japanese yen. The agent charges 15% commission on the price of the car and a further 72,220 Japanese yen for shipment. How much money in Kenyan shillings will you need to send the agent to obtain the car.

1 US\$ = 117.20 Japanese yen

1US\$ = Kshs 103.34

(3marks)

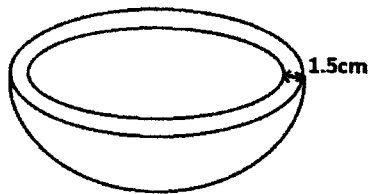
9. A container of height 90cm has a capacity of 90 litres . What is the height of a similar container of volume 9m^3 (3marks)

10. Juma paid Kshs 3200 for a video game CD. After getting a discount of 13.5%. How much should the shopkeeper have sold the CD to enable him to make a profit of 5%? (3marks)

11. Three towns M, N and O are such that N is 40km on a bearing of 290° from M. Town O is directly to the south of M. The distance between N and O is 60km. By scale drawing, find the distance between M and O. (4marks)

12. Express $0.\dot{7}3$ as a fraction. (2marks)

13. The figure below shows a hemisphere bowl of thickness 1.5cm. Given that the external surface area is 509cm^2 , Find the volume of the bowl. (Take $\pi = 3.142$) (3marks)



14. Peter, James and David contributed shs 19,000. The ratio of contribution of peter to David was 3:7 and that of David to James was 6:5. How much did David contribute
(3marks)

15. Given that $\sin Q = \frac{\sqrt{3}}{2}$ determine without using tables the values of $\cos \theta$ and $\tan \theta$
(3marks)

16. The angle of elevation of the top of storey building from point P is 23.60° From another point Q 6m nearer to the base of the building, the angle of depression from the top of the building is 35° . Calculate to 1dp the height of the building. (4marks)

SECTION II (50 MARKS)

Answer any Five questions from this section.

17. A sector of angle 108° is cut from a circle of radius 20cm. Its folded to form a cone .

Taking π as $\frac{22}{7}$, calculate .

a) The curved area of the cone. (2marks)

b) The base radius of the cone. (3marks)

c) The vertical height of the cone. (2marks)

d) If 12cm of the cone is chopped off from the top to form a frustrum . Calculate the volume of the frustrum . (3marks)

18. The following are masses of 25 students in a form 4 class

49	51	50	60	55	45	56	51	58	59
44	59	42	50	62	46	43	51	56	52
43	41	40	54	44					

- a) Draw a frequency distribution table with the lower class as 40 - 43 (4marks)
- b) Estimate the mean mass (2marks)
- c) Draw a histogram for the data. (4marks)

19. A cold water tap can fill a bath in 3 minutes while a hot water tap can fill it in five minutes. The drain pipe can empty the full bath in $3\frac{3}{4}$ minutes. The two taps and the drain pipe are fully opened for 2 minutes after which drain pipe is closed.
- a) What fraction of the tank is filled after the first two minutes? (3marks)

- b) How much more time is required for the bath to be filled after the closure of drain pipe (3marks)

- c) Given that the cold tap delivers water at the rate of $200\text{cm}^3/\text{s}$, determine
i) Capacity of the bath in litres. (2marks)

- ii) Rate of flow of the hot water tap (2marks)

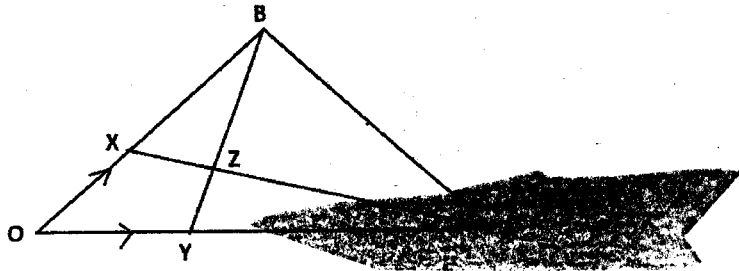
20. Maralal and Nairobi are 350km apart. Two buses A and B started from Nairobi at the same time travelling towards maralal. Bus B travelling at an average speed of 12km/hr more than bus A reaches Maralal $1\frac{1}{5}$ hours earlier

a) Find the average speed of A

(6marks)

b) How far was A from Nairobi when B was 20 minutes to reach Maralal? (4marks)

21. The figure below shows a triangle OAB. Point Y divides the line OA in the ratio 1:2 and point X divides OB in ratio 1:2. AX and YB intersect at Z.



Given that $\vec{OA} = \underline{a}$ and $\vec{OB} = \underline{b}$

- a) Express in terms of \underline{a} and \underline{b}

i) \vec{AB} (1mark)

ii) \vec{XY} (1mark)

- b) Given that $\vec{YZ} = \frac{1}{4}\vec{YB}$. Express in terms of \underline{a} and \underline{b}

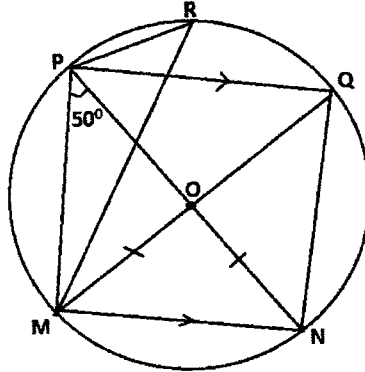
i) \vec{YB} (2marks)

ii) \vec{AZ} (2marks)

iii) \vec{ZX} (2marks)

- c) Show that point AZ and X are collinear (2marks)

22. In the figure below O is the centre of the circle and NOP is the diameter .
 $MO = ON = OP$, $\angle MPN = 50^\circ$. PQ is parallel to MN.



- i) Calculate with reason, the size of $\angle NPQ$ (2marks)
- ii) Reflex $\angle MON$ (2marks)
- iii) $\angle PRM$ (2marks)
- iv) $\angle PMQ$ (2marks)
- v) $\angle RPQ$ (2marks)

23. An arithmetic progression of 41 terms is such that the sum of the first five terms is 560 and the sum of the last five terms is -250. Find.

a) The first term and the common difference (5marks)

b) The last term. (2marks)

c) The sum of the progression (3marks)

24. A triangle PQR is such that the vertices are P(1,2), Q(4,2) and R(1,6), On reflection, the image of the triangle becomes $\Delta P'Q'R'$ with P'(-3,-2), Q'(-3,-5) and R'(-7-2)
- a) On the same axes, draw ΔPQR and its image $\Delta P'Q'R'$ (3marks)
- b) Find the equation of the mirror line (3marks)
- c) Calculate the area of $\Delta P'Q'R'$ (2marks)