

**THE INTRA-NATIONAL GIANTS EXAMINATION**

**Kenya Certificate of Secondary Education**

**121/1**

**Mathematics ALT**

**July. 2023 – 2 hours**

**Paper 1**



Name..... Index Number.....

Candidate's Signature..... Date.....

**Instructions to candidates**

497

- a) Write your name and index number in the spaces provided above.
- b) Sign and write the date of examination in the spaces provided above.
- c) Answer all the questions in the spaces provided.
- d) This paper consists of two sections: Section I and Section II.
- e) Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
- f) Non-programmable silent electronic calculators and KNEC mathematical tables may used except where stated otherwise.
- g) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- h) **Candidates should answer the questions in English**

**Section I**

**For Examiner's Use Only**

A011

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

**Section II**

17	18	19	20	21	22	23	24

**Grand Total**



**317804**



**Turn Over**

**SECTION I (50 MARKS)****Answer ALL the Questions in this section in the spaces provided**

1. Solve (3 marks)

$$\frac{3}{5} \div \frac{2}{3} - \frac{1}{2} \times \frac{1}{13} \text{ of } \left( \frac{1}{2} + \frac{4}{5} \right)$$

2. Given that point A(2,4) and B(8, -4) , find the equation of the perpendicular bisector of line AB.

(3 marks)

3. Solve the following inequality and represent your solution on a number line. (3 marks)

$$3 + x - 4(x - 3) \leq 30$$

4. A Japanese travelling from Britain arrives in Kenya with 10,000 Euros which all was converted to Kenya shillings at the bank. While in Kenya, he spends a total of Kenya shillings 498,500 and then converts the remaining Kshs to Japanese Yen at the bank. Use the exchange rate table below to calculate the amount in Japanese Yen that he receives.

	Buying(Kshs.)	Selling(Kshs.)
1 Euro	120.25	121.15
100 Japanese Yen	62.75	63.000

(4 marks)

5. Use a calculator to work out ( 3 marks)

$$\left( \frac{34^3 \times 1257}{27 \times 1243} \right)^{\frac{1}{4}}$$

6. Evaluate the following without using mathematical tables or calculator. (3 marks)

$$\frac{\sin 30^\circ \tan 240^\circ \cos 60^\circ}{\cos 120^\circ \sin 45^\circ}$$

7. The equation of a circle is given by  $2x^2+16x+2y^2-4y-2=0$ . Determine the radius and centre of the circle. (3 marks)

8. The perimeter of a triangular field is 120m. Two of the sides are 21m and 40m. Calculate the largest angle of the field hence find the area of the field. (3 marks)

9. Use the reciprocal tables, square tables and cube tables to evaluate; (3 marks)

$$\frac{5}{(26.52)^2} - \frac{3}{(0.00482)^{\frac{1}{2}} + 2.734^3}$$

10. The ratio of the fourth to the first term of a G.P is  $\frac{1}{8}$ . If the first term exceeds the second term by 5, find the first and the 8<sup>th</sup> terms of the sequence. (3 marks)

11. The total marks scored in a test by 6 pupils was 420. If the mean mark for the first 5 pupils was 68 find the marks scored by the sixth pupil. (3 marks)

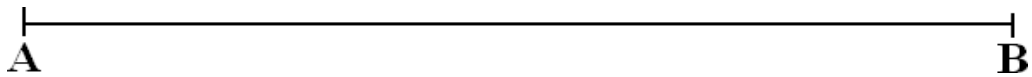
12. Solve the following simultaneous equations using Matix Method. (3 marks)

$$4a+3b=120$$

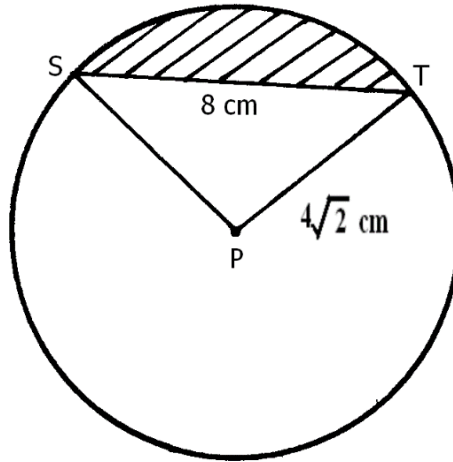
$$2a+5b=130$$

13. A triangle PQR has a height of  $x$  cm and a base of  $(x+3)$  cm. if its area is  $5 \text{ cm}^2$ , calculate the height of its base. (3 marks)

14. Using a set square, a ruler and a pair of compasses, divide the given line into five equal parts (3 marks)



15. The figure below shows a circle with centre P and radius  $4\sqrt{2}$  cm. if the length of the chord ST is 8 cm, show that the shaded area is  $(8\pi-16)$  cm<sup>2</sup>. ( 3 marks)



16. A self help group of 10 young men invested Shs 72,000 in two companies A and B. A pays a dividend of 22.5% while B pays a dividend of 21%. If from their total investment they obtained a return of 21.5%, how much money did they invest in each company? (4 marks)

**SECTION II (50 MARKS)****Answer ANY FIVE questions from this section in the spaces provided**

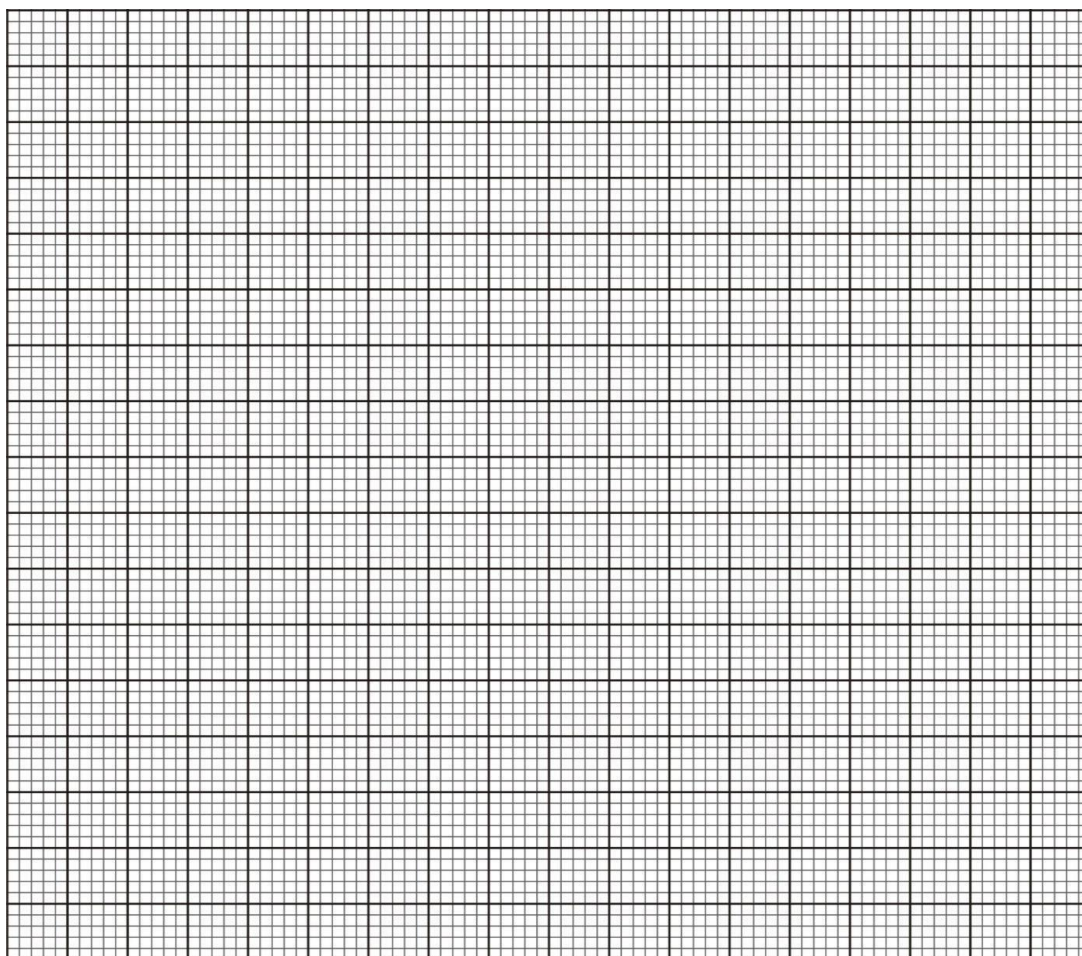
17. a) Use the trapezium rule with 5 strips to estimate the area enclosed by the curve, the x-axis and the lines  $x=-2$  and  $x=3$  of the curve  $y=x^2+x+9$  (4 marks)
- b) Find the exact area bounded by the curve, the x-axis and the line  $x=-2$  and  $x=3$ . (4 marks)
- c) Find the percentage error in your workings. (2 marks)



18. Two quantities A and B are related by the equation  $A=KB^n$ . the table below shows the corresponding values of A and B from the relation.

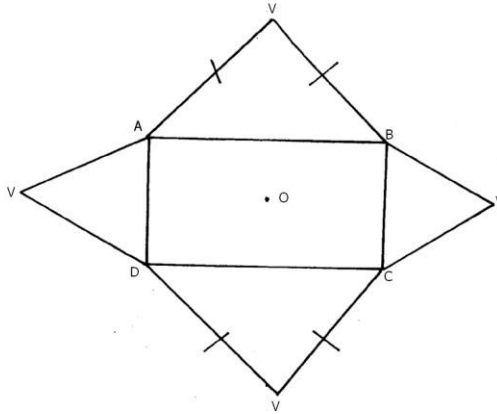
A	1.2	1.5	2.0	2.5	3.5	4.5
B	1.57	2.26	3.39	4.73	7.87	11.5

- a) Determine a linear equation connecting A and B. (1 mark)
- b) Draw a suitable straight line graph to represent the relationship above. (5 marks)



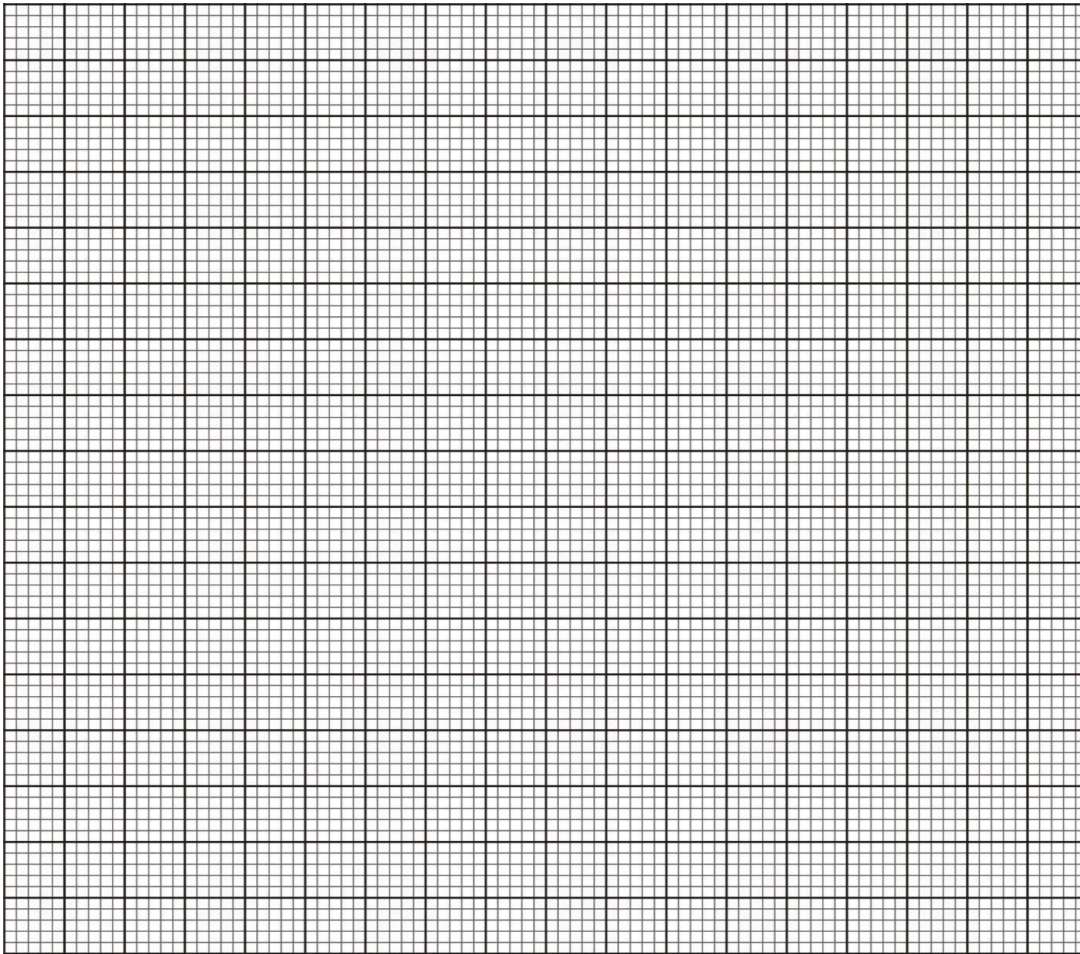
- c) Use your graph to estimate the values of K and n (3 marks)
- b) Write down the equation connecting A and B. (1 mark)

19. The figure below shows the net of a regular rectangular based pyramid. The rectangle measures 18 cm by 15 cm. N and K are mid-points of AD and BC respectively.  $AB=18$  cm and  $BC=15$  cm while  $VK=16$  cm. V is the vertex and O is the centre of the rectangle ABCD.



- a) Sketch the pyramid and label all the vertices (1 mark)
- b) From the diagram in (a) above, calculate to 2 decimal places.
- i) Length CV (2 marks)
- ii) Length VO (2 marks)
- iii) The angle between the plane VCB and the base ABCD. (2 marks)
- iv) The angle between the plane BVC and AVD (3 marks)

20. Draw triangle ABC with A(3,4), B(1,3) and C(2,1)
- Draw  $\Delta A^I B^I C^I$ , the image of  $\Delta ABC$  under a rotation of  $+90^\circ$  about (O,O) (2 marks)
  - Draw  $\Delta A^{II} B^{II} C^{II}$ , the image of  $\Delta A^I B^I C^I$  under a reflection in the line  $y=x$ . (2 marks)
  - Draw  $\Delta A^{III} B^{III} C^{III}$ , the image of  $\Delta A^{II} B^{II} C^{II}$  under a rotation of  $+90^\circ$  about (O,O)(2 marks)



- d) Describe a single transformation that maps  $\Delta ABC$  onto  $\Delta A^{III} B^{III} C^{III}$ . (2 marks)

- e) State the type of congruence between the object and the final image. (2 marks)

21. Two types of tea in Kericho grade A and grade B1 are mixed. Grade A costs sh. 85 per kg, and grade B costs sh. 70 per kg.

a) If the tea are mixed in the ratio 2:1, find the cost 2kg of the mixture. (3mks)

b) The tea is to be sold in 2kg boxes at a 30% profit. Find the selling price of the tea.(2 mks)

c) At the end of the week the price of a 2kg box is reduced to sh. 125. Find the percentage reduction in the price. (2mks)

d) Originally 200kg of grade A and 100kg of grade B were bought 240kg of the mixture was sold at the price of part b, and the rest was sold at the reduced price of part C. Find the overall percentage profit. (3mks)

22. A motorist is to follow the route ABCD. B is 250 km from A on a bearing of  $N75^{\circ}E$  from A. C is on a bearing of  $S75^{\circ}E$  from A and 275 km from B. D is 300 m on a bearing of  $S80^{\circ}E$  from B. Using a scale of 1 cm to represent 50 km;

a) Show the relative position of ABCD. (6 marks)

b) Determine:

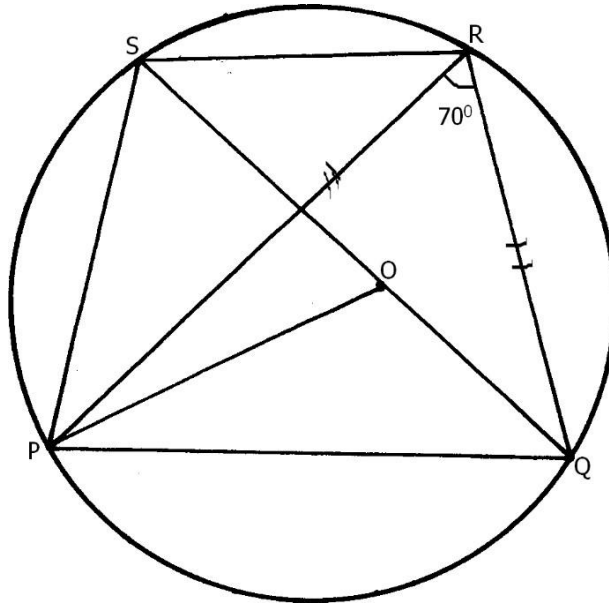
i) The distance of A from C (1 mark)

ii) The bearing of B from C (1 mark)

iii) The distance of A from D (1 mark)

iv) The compass bearing of C from D (1 mark)

23. The figure below shows a circle centre O. PQRS is a cyclic quadrilateral and QOS is a straight line.



Giving reasons for your answers, find the value of:

- a)  $\angle PRS$  (2 marks)
- b)  $\angle POQ$  (2 marks)
- c)  $\angle RPS$  (2 marks)
- d)  $\angle PSR$  (2 marks)
- e) Reflex  $\angle POS$  (2 marks)

24. A matatu left town A at 7.00 a.m and travelled towards a town B at an average speed of 60km/h. A second matatu left town B at 8.00 a.m and travelled towards town A at an average 60 km/h. If the distance between the two towns is 400 km, find:

a) The time at which the two matatus met. (5 marks)

b) The distance of the meeting point from town A. (5 marks)

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