

Name Index Number...../

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

121/1

MATHEMATICS ALT A

JULY 2019

Paper 1

Time: 2½ hours

SAMIA SUB-COUNTY JOINT EXAMINATION

Instructions to candidates:

- (a) Write your name, Index number, in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) The paper contains **two** sections: **Section I** and **Section II**.
- (d) Answer **All** the questions in **Section I** and any **five** questions from **Section II**
- (e) All answers and working must be written on the question paper in the spaces provided below each question.
- (f) **Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.**
- (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 no questions are missing.**
- (j) **Candidates should answer the questions in English.**

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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

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SECTION I (50 MARKS)

Answer all questions in this Section

1. What is the total value of digit 6 in the solution to

$$1725 - 125 + 6591 \div 39 \times 5 \text{ of } 90$$

(3 marks)

2. Find the possible values of x in the equation $9^{x^2} = 27^{(2x + 12)}$

(3 marks)

3. A matatu left town A at 8.00a.m. and travelled towards town B at an average speed of 60km/hr. A second matatu left town B towards A at 9.00a.m. at an average speed of 60km/hr. If the distance between the two towns is 400km, find the time the two matatus met.

(3 marks)

4. A Kenyan tourist left Germany for Kenya through Switzerland. While in Switzerland he bought a watch worth 52 Deutsche marks.

Use the exchange rates below

1 Swiss Franc = 1.28 Deutsche marks

1 Swiss Franc = 45.21 Kenya shillings

Find the value of the watch in:-

(a) Swiss Francs (2 marks)

(b) Kenya shillings (1 mark)

5. Peter is 15m away from the bottom of a tower. He spots a bird on top of the tower at an angle of elevation of 62° . Also John spots the same bird at an angle of elevation of 30° . Find the distance between John and Peter if they are on the same line. (3 marks)

6. The lines $4ax = 3y + 12$ and $7bx - 2 = 3y$ are parallel .Find the ratio a:b
(3 marks)

7. A rectangular water tank measures 2.6m by 4.8m at the base and has water to a height of 3.2m. Find the volume of water in liters that is in the tank. (3 marks)

8. Using a pair of compasses and a ruler only, construct trapezium ABCD in which $AB = 8\text{cm}$, $BC = 5\text{cm}$, $CD = 4.1\text{cm}$ and angle $ABC = 60^\circ$ and AB is parallel to DC. Determine through construction, the height of the trapezium. (4marks)

9. Simplify as far as possible. $\frac{3}{x-y} - \frac{1}{x-y}$ (2 marks)

10. Given that $\frac{\frac{3}{5} \text{ of } 60 - 2\frac{2}{3} \times 1\frac{1}{2}}{5\frac{5}{8} \times 1\frac{7}{9} - \frac{5}{4} \text{ of } 4\frac{4}{5} + 2\frac{4}{5} \div \frac{7}{10}} = m$ find the value of m (3 marks)

11. The table below shows the distribution of ages in years of 50 adults who attended a clinic:-

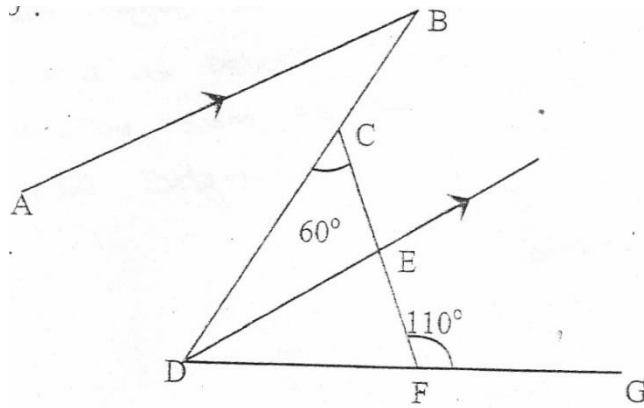
Age	21-30	31-40	41-50	51-60	61-70	71-80
Frequency	15	11	17	4	2	1

- (a) State the median class (1 mark)
- b) Calculate the mean age (3 marks)

12. Juma ,Ali and Hassan share the profit of their business in the ratios 3:7:9 respectively. If Juma receives sh 60 000. How much profit did the business yield? (3 marks)

13. Wasakania bought two shirts and three pairs of trousers at ksh 1,750. If he had bought three shirts and two pairs of trousers he would have saved sh 250. Find the cost of a shirt and a trouser (3 marks)

14. In the figure below, AB is parallel to DE, DE bisects angle BDG, angle DCF = 60° , angle CFG = 110°



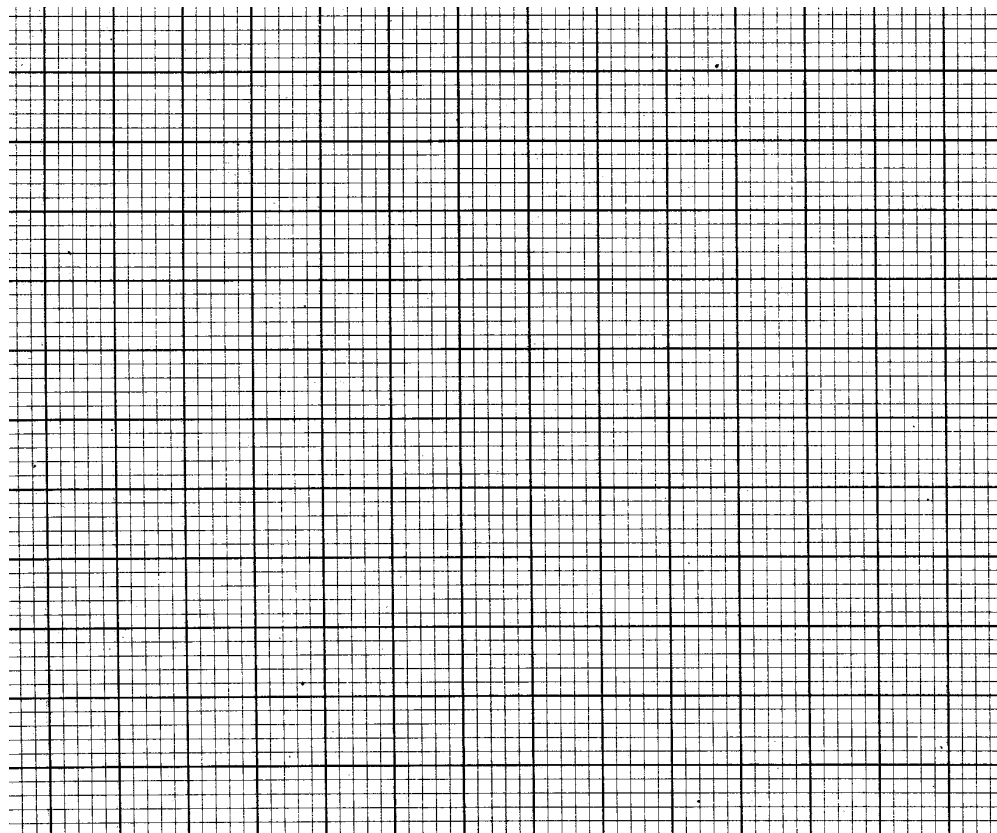
Find giving reasons for your answers

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

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

15. Three vertices of a parallelogram PQRS are P(-1,2), Q(8,-5) and R(5,0).

- (i) On the grid provided below, draw the parallelogram PQRS. (2 marks)



- (ii) Determine the length of the diagonal QS. (1 mark)

16. Given that $k\vec{m} + h\vec{n} = \vec{r}$ and that $\vec{m} = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$, $\vec{n} = \begin{pmatrix} 0 \\ 4 \end{pmatrix}$ and $\vec{r} = \begin{pmatrix} -6 \\ 0 \end{pmatrix}$. Find the scalars k and h (3 marks)

SECTION II: 50 MARKS

Answer any FIVE questions in this section

17.(a) Find the inverse of the matrix

(2 marks)

$$\begin{bmatrix} 2 & 5 \\ 4 & 3 \end{bmatrix}$$

(b) A transport company has two types of vehicles for hire: Fuso and Canter. The vehicles are hired per day. The cost of hiring two Fusos and five Canters is Sh. 156,000 and that of hiring 4 Fusos and three Canters is Sh. 137,000.

(i) Form two linear equations to represent the above information.

(2 marks)

(ii) Use matrix method to determine the cost of hiring a Fuso and that of hiring a Canter.

(3 marks)

(c) Find the value of x given that $\begin{bmatrix} 2x-1 & 1 \\ x^2 & 1 \end{bmatrix}$ is a singular matrix

(3 marks)

18. Two types of tea in kericho grade A and grade B are mixed. Grade A costs Sh 85 per kg and grade B costs sh 70 per kg.

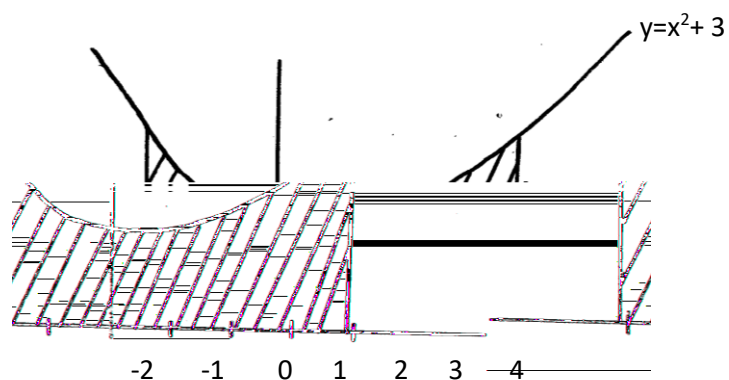
a) If the tea is mixed in the ratio 2:1, find the cost of a 2kg box of the mixture.
(3 marks)

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

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.
(2 marks)

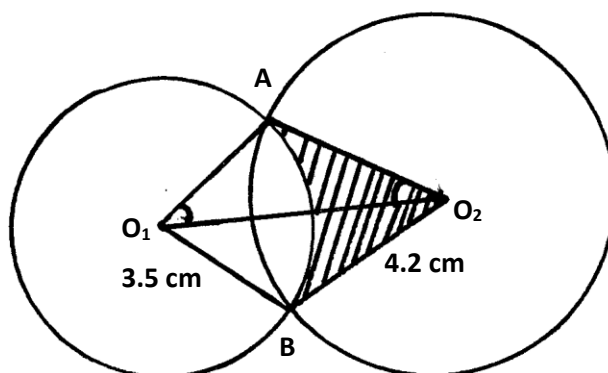
d) Originally 200kg of grade A and 100kg of grade B were bought. 240kg of the mixture was sold at the price of part b ,and the rest was sold at the reduced price of part c. Find the overall percentage profit .
(3 marks)

19. Given is a sketch of area bounded by the curve $y = x^2 + 3$ and lines $x = -2$, $x = 4$ and $y = 0$



- (a) Use the mid - ordinate rule with 6 strips to estimate the shaded area.
(4 marks)
- (b) Determine the exact area in (a) above.
(3 marks)
- (c) Find the percentage error in the estimated area above
(3 marks)

20. Two circles of radii 3.5 and 4.2 cm with centres O_1 and O_2 respectively intersect at points A and B as shown in the figure below. The distance between the two centres is 6 cm.



Calculate

- (a) The size of $\angle AO_1B$ (to the nearest degree) (3 marks)

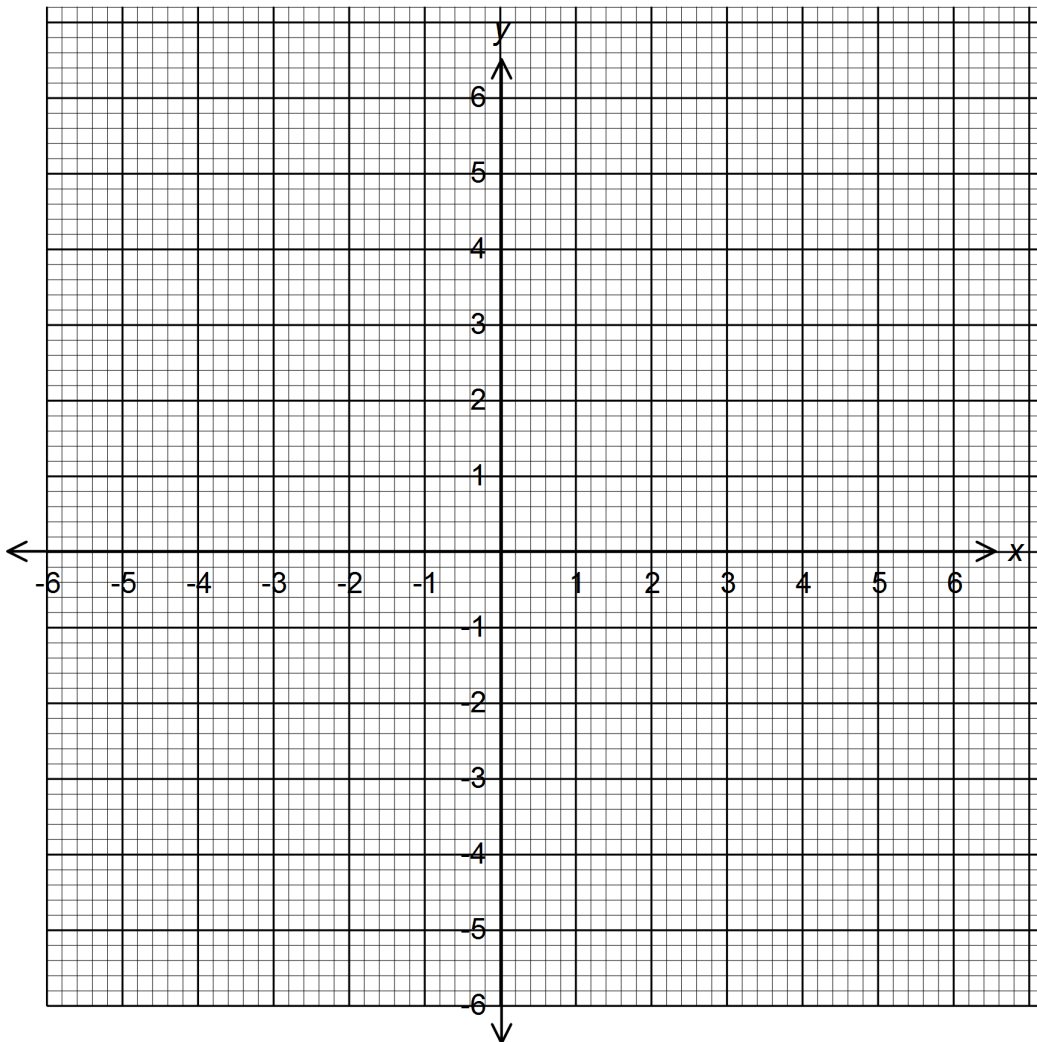
- (b) The size of $\angle A O_2 B$ (to the nearest degree) (3 marks)

- (c) The area of quadrilateral O_1AO_2B , correct to 2 decimal places. (2 marks)

- (d) The shaded area correct to two significant figures. (take $\pi^{22/7}$) (2 marks)

21. Draw triangle ABC with A(3, 4), B(1, 3) and C(2, 1).

(a) Draw triangle $A^1B^1C^1$, the image of triangle ABC under a rotation of $+90^\circ$ about (O, O)
(2 marks)



(b) Draw triangle $A^{11}B^{11}C^{11}$, the image of triangle $A^1B^1C^1$ under a reflection in the line $y = x$
(2 marks)

(c) Draw triangle $A^{111}B^{111}C^{111}$, the image of triangle $A^{11}B^{11}C^{11}$ under a rotation of $+90^\circ$ about (O, O).
(2 marks)

(d) Describe a single transformation that maps triangle ABC onto triangle $A^{111}B^{111}C^{111}$.
(2 marks)

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

22. A photograph is mounted on a frame that it leaves a uniform border at the bottom and at the top. At each side a uniform border which is half the border at the bottom is left. If the side of the square photograph is 5cm and area of frame is 75cm^2 .

(a) Write down a simplified equation for the area of the frame (2 marks)

(b) What are the dimensions of the frame? (4 marks)

(c) What is the percentage area of the frame that is not covered by the photograph?
(4 marks)

23. Funyula Municipal Council is to construct a floor of an open wholesale market whose area is 800m^2 . The floor is to be covered with a slab of uniform thickness of 200mm . In order to make the slab, sand, cement and ballast are to be mixed such that their masses are in the ratio $3:2:3$. The mass of dry slab of volume 1m^3 is 2000kg . Calculate

(a) (i) The volume of the slab (2 marks)

(ii) The mass of the dry slab. (2 marks)

(iii) The mass of cement to be used. (2 marks)

(b) If one bag of the cement is 50kg , find the number of bags to be purchased. (1mark)

(c) If a lorry carries 10 tonnes of ballast, calculate the number of lorries of ballast to be purchased. (3 marks)

24. The displacement X metres of a particle after t seconds is given by

$$x = t^3 - 2t^2 + 6, \text{ where } t > 0$$

a) Calculate the velocity of the particle in m/s when $t = 2$ seconds (3marks)

b) When the particle is momentarily at rest, calculate;

i) Displacement (4 marks)

ii) Acceleration (3 marks)

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