NAME…… INDEX NO. ……

SCHOOL: …..…… DATE: ……....

SIGN: ……..……

121/1
MATHEMATICS ALT. A
PAPER 1
DEC - 2021
TIME: 2 ½ HOURS

SAMIA SUB-COUNTY JOINT EVALUATION TEST-2021

Kenya Certificate of Secondary education (K.C.S.E)

121/1
MATHEMATICS
PAPER 1
2 ½ HOURS

INSTRUCTIONS TO THE CANDIDATES

a) *Write your **name** and **Random no.** the spaces provided above.*
b) *Sign and write **date** of examination in the spaces provided above.*
c) *This paper consists of **two** sections; **SectionI** and **Section II.***
d) *Answer **All** questions in **Section I** and only **Five** questions from **section II***
e) ***All** answers and working **must** be written on the question paper in the spaces provided below each*
f) *question.*
g) *Show all the steps in your calculations giving answers at each stage in the spaces provided below each*
h) *question.*
i) *Marks may be given for correct working even if the answer is wrong.*
j) *Non-programmable silent electronic calculators and KNEC Mathematical tables may be used except where stated otherwise.*
k) ***This paper consists of 16 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.***
m) *Candidates should answer 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)

Attempt all questions in this section

1. Evaluate $\dfrac{-4 \text{ of } (-4 + -5 \div 15) + -3 - 4 \div 2)}{84 \div -7 + 3 - -5}$ (3 mks)

2. Simplify $\dfrac{9x^2 - 1}{3x^2 + 2x + 1}$ (1 mk)

3. Evaluate without using a calculator or mathematical table leaving your answers as a simplified fraction. (2 mks)

$$\frac{\frac{4}{11} \text{ of } \frac{3}{4} - \frac{1}{20}}{\left(3 + \frac{1}{3}\right) \div \left(1 + \frac{1}{10}\right)}$$

4. A poultry farmer has twenty times as many hens as turkey and three quarters as many ducks as turkeys.

(a) If there are t, turkeys, write down a simplified expression in terms of t for the total number of birds on the farm. (1 mk)

(b) Give that he has 72 ducks, calculate as a percentage the sum of turkeys and ducks to the number of hens in the farm. (2 mks)

5. Use tables of reciprocals only to work out. (3 mks)

$$\frac{5}{0.0396} + \frac{12}{0.593}$$

6. A straight lines passes through points A(-2,6) and B(4, 2).

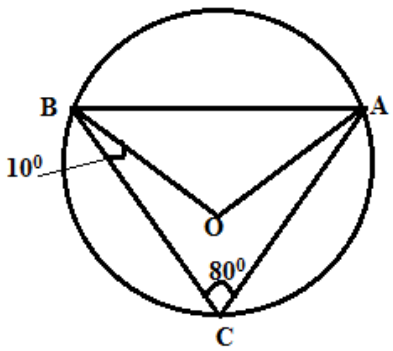
(a) M is the midpoint of line AB. find the coordinates of N. (2 mks)

(b) Determine the equation of a straight line passing through point M and is perpendicular to AB. (2 mks)

7. An open right circular core has radius of 5cm and a perpendicular height of 12cm. Calculate the surface area of the core. (take $\pi=3.142$). (3 mks)

8. Moraa spends a total of sh. 970 on buying 3 text books and 5 pens. if had bought 2 textbooks and 8 pens she would have saved sh. 90. Find the cost of one textbook. (3 mks)

9. In the figure below O is the centre of the circle. $<BCA = 80^0$ and $<CBO = 10^0$. Determine the size of $<CAB$. (3 mks)



10. The table below shows speeds of vehicles measured to the nearest 10km/h as they passed a certain point.

Speed(km/h)	30	40	50	60	70	80	90	100	110
Frequency	1	4	9	14	38	47	51	32	4

a) Calculate the mean speed of vehicles (3 marks)

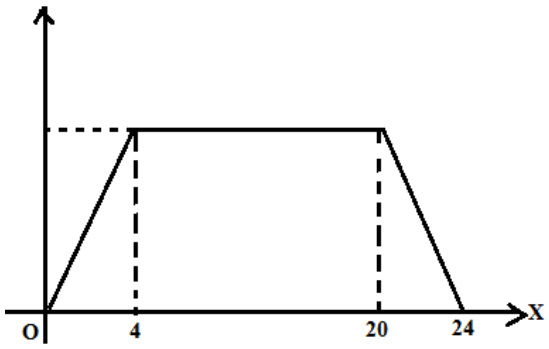
b) State the modal speed (1mark)

11. Find the of x if. (3 mks)

$$\left(\frac{27}{8}\right)^{x+7} = \left(\frac{4}{9}\right)^{-3x}$$

12. The image of a point K(1,2) after translation is K^1 (-1,2). what is the coordinate of the point R whose image is R^1 (-3,3) after undergoing the same translation. (3 mks)

13. The figure below is a velocity time graph for a car.



(a) Find the total distance travelled by the car (2 mks)

(b) Calculate the deceleration of the car. (2 mks)

14. Security light poles have been erected along both sides of a street in Kisii town. The poles are 50m apart along the left hand side of the road while they are 80m apart along the right hand side. At one end of the road the poles are directly opposite each other. How many poles will be erected by time the poles are directly opposite each other at end of the road? (3 mks)

15. The exterior angle of a regular polygon is equal to one third of the interior angle. Calculate the number of number of sides of the polygon. (3 mks)

16. Solve the following inequality and state the integral values

$\frac{1}{2}(24-4x) > 6\left(3x-\frac{4}{3}\right) \geq -\frac{2}{3}(42+3x)$ (3 mks)

SECTION II

Attempt only FIVE questions from this section

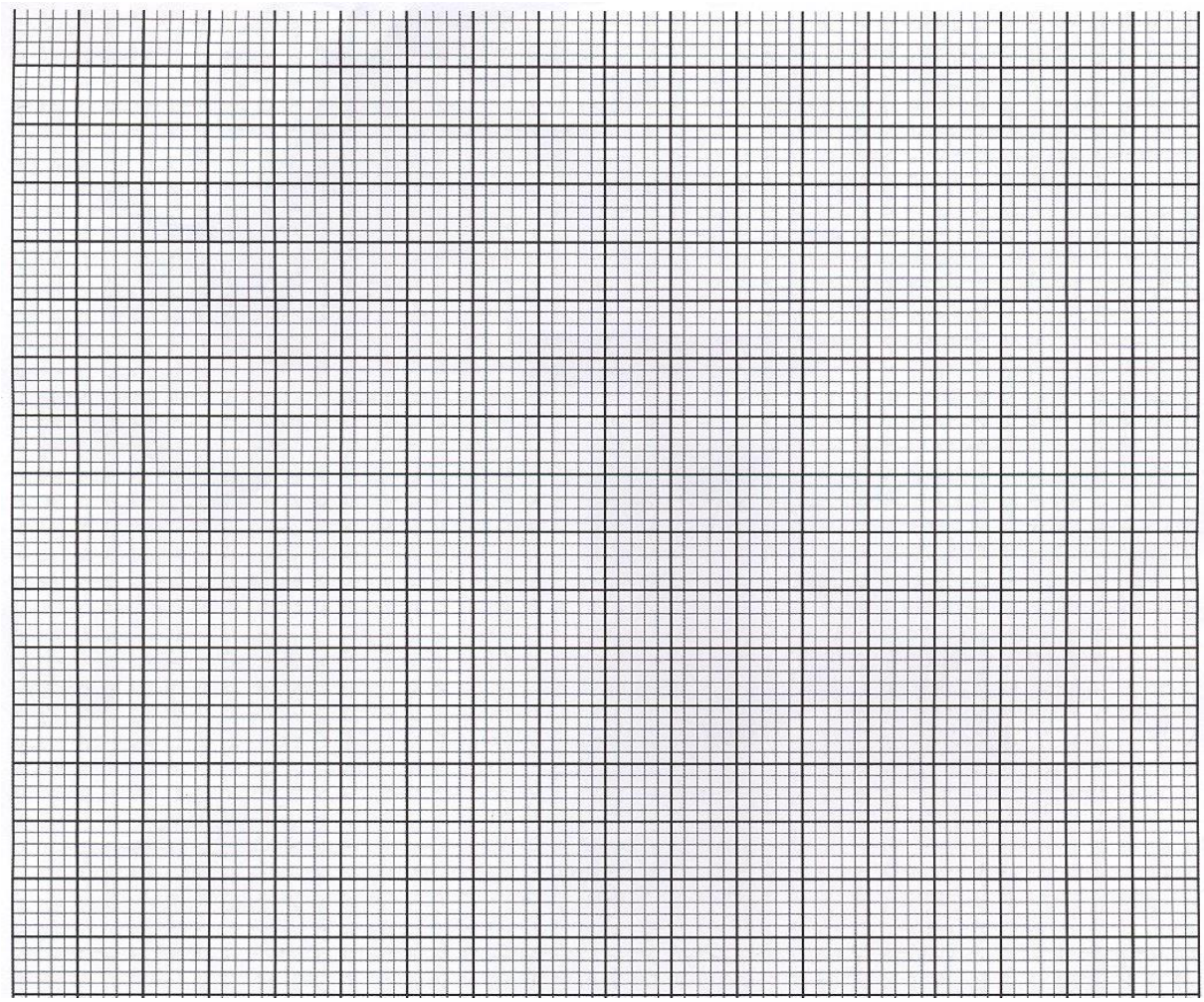
17. (a)Complete the table below for the function $y=7+2x-2x^2$ for the range $-3 \leq x \leq 4$.(2 marks)

X	-3	-2	-1	0	1	2	3	4
$-2x^2$		-8	-2	0		-8	-18	
2x	-6	-4		0		4	6	
7	7	7	7	7	7	7	7	7
Y		-5		7		3	-5	

(b) (i) On the grid provided draw the graph of $y=7+2x-2x^2$. (3 marks)

Take the scale:2 cm to represent 1 unit on x- axis

1 cm to represent 1 unit on y- axis



(ii) Use your graph to estimate the roots of $7 + 2x - 2x^2 = 0$. (1 mark)

(c) (i) By drawing a suitable line on the same axes in (b) above solve the equation

$9 + 5x - 2x^2 = 0$ (3marks)

(ii) State the co-ordinates of the turning point .(1 mark)

18. Paul is a sales executive earning sh 20,000 and a commission of 8% for the sales in excess of 100,000. In January 2014 he earned a total of 48000 in salaries and commissions.

(a) Determine the amount of sales he made in that month. (4 mks)

(b) If the total sales inn the month of February and march increased by 18% and then dropped by 25% respectively. Calculate.

(i) Paul`s commission in the month of February. (3 mks)

(b) If the total earnings in the month of march. (3 mks)

19. Two tasks are similar in shape. The capacity of the tanks are 1,000,000 litres and 512,00 litres respectively.

(a) Find the height of the smaller tank if the larger one is 300cm tall. (5 mks)

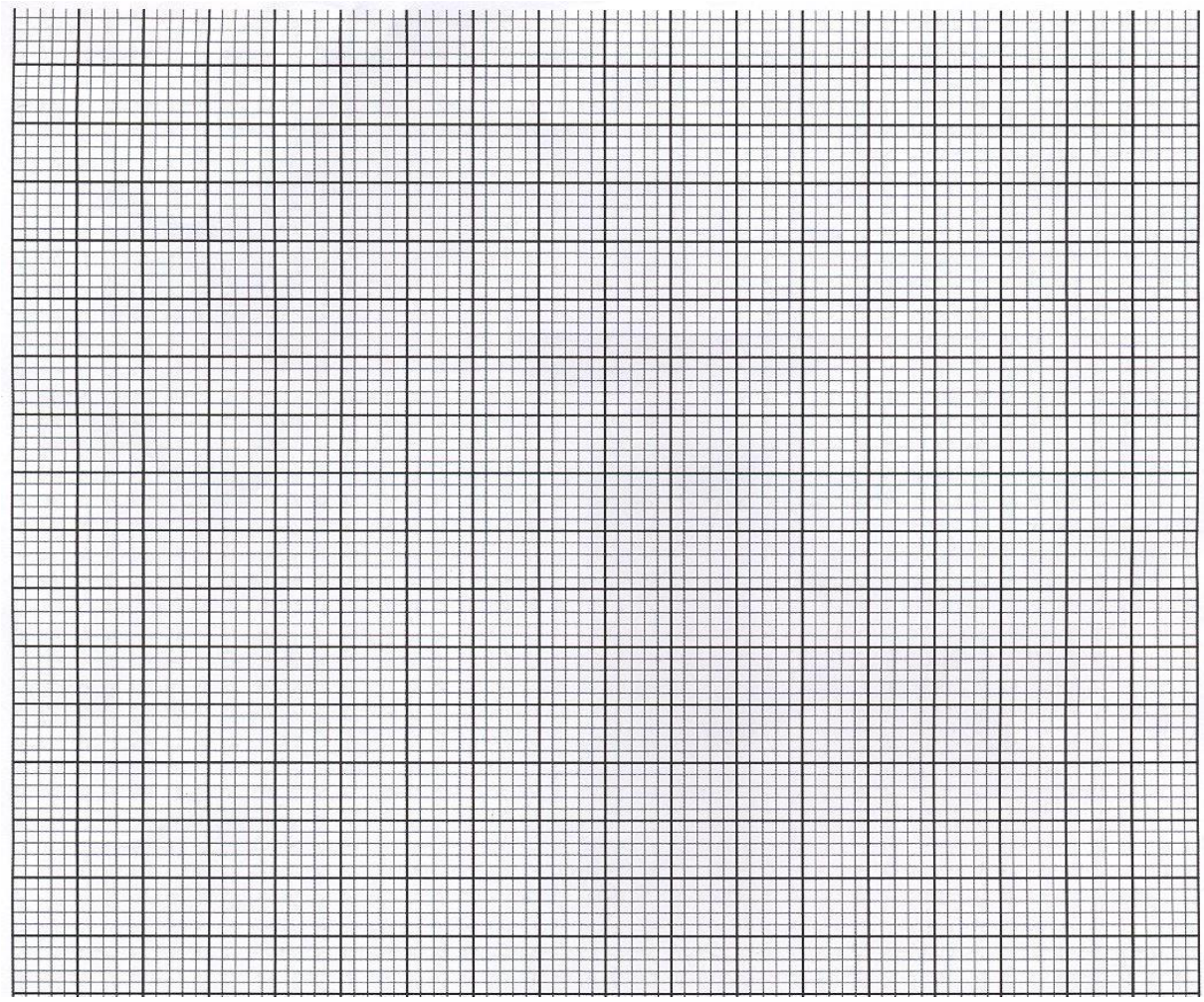
(b) Calculate the surface area of the tank if the smaller one has a surface area of $768cm^3$ (3 mks)

(c) Calculate the mass of the larger tank if the mass of the larger one is 800kg. (2 mks)

20. The vertices of a triangle ABC are A(2,5) B(4,3) and C(2,3). **P** represents half-turn about the origin.

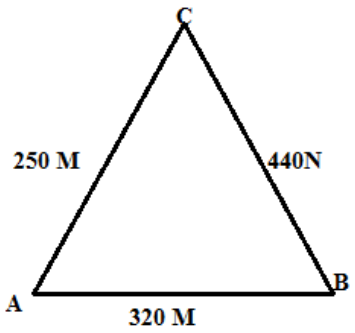
(a) Draw triangle ABC and $A^1B^1C^1$ under **P**. (4 mks)

(b) **T** represents a reflection in the line x = 0 and **K** represents a translation $\begin{pmatrix} 0 \\ -2 \end{pmatrix}$. Find the coordinates of $A^{11}B^{11}$ and C^{11} under **T** and $A^{111}B^{111}C^{111}$ under **K.** Hence, draw triangle $A^{11}B^{11}C^{11}$. (4 mks)



(c) Find the area of the triangle $A^{11}B^{11}C^{11}$. (2 mks)

21. Ombati owns a farm that is triangular in shape as shown below.



(a) Calculate the size angle BAC. (2 mks)

(b) Find the area of the farm in hectares. (3 mks)

(c) Ombati wishes to irrigate his farm using a sprinkler machine in the farm such that it is equidistant from points A. B and C.

(i) The sprinkler rotates in a circular motion so that the maximum point reached by the water jets is the vertices A, B and C. Calculate the area outside the farm that will be irrigated. (5 mks)

22. Trasnsline bus left Nairobi at 8.00 am and travelled Kisii at an average speed of 80km/h. A car left Kisii at 3.30 am and travelled to Nairobi at an average speed of 120km/h. Given that the distance between Nairobi and Kisii is 400km, Calculate.

(a) The time the car arrived in arrived in Nairobi. (3 mks)

(b) The time the two vehicles met. (4 mks)

(c) The distance from Nairobi to the meeting point. (2 mks)

(d) The distance of the bus from Kisii when the car arrived in Nairobi. (2 mks)

23. Town B is 102km on the bearing of 122^0 from town A. Town C is 94 km on bearing of 062^0 from B. Town D is on a bearing of 073^0 from A and 336^0C.

(a) Using a scale of 1cm to represent 20km, draw a scale diagram to show the relative positions of town A, B, C and D. (4 mks)

(b) Using your diagram, determine.

(i) The bearing B from D. (1 mk)

(ii) The bearing of A from C. (1 mk)

(iii) The distance from town A to D. (1 mk)

(iv) The distance from town B and D. (1 mk)

24. A particle moves along a straight line such that its displacement S metres from a given point is $S = t^3 - 5t^2 + 3t + 4$ where t is time in seconds. Find

a) The displacement of the particle at t = 5 (2marks)

b) The velocity of the particle when t = 5 (3 marks)

c) The values of t when the particle is momentarily at rest (3 marks)

d) Acceleration of the particle when t = 2 (2marks)

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