NAME _____ ADM NO _____CLASS _____

121/2
MATHEMATICS
FORM FOUR
PAPER 2
SEPTEMBER 2021
TIME: $2^{1}/_{2}$ HOURS

MOMALICHE JOINT EXAMINATION.
Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES

- *Write your name, class and admission number*
- *The paper contains two section: section I and section II*
- *Answer ALL questions in section I and only five questions in section II.*
- *All answers and working must be written on the question paper in the space provided below each question.*
- *Show all the steps in your calculations, giving your answers at each stage, marks may be given for correct working even if the answer is wrong.*

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

1. Jane mistypes $(x + y)^2$ as $x^2 + y^2$. Find the percentage error in the evaluation of $(x + y)^2$ when x= -2 and y= 12
   (3mks)

2. An arc length a cm subtends angle of 0.39^c at the centre of a circle of radius 6cm. find the value of a
   (3mks)

3. Find the semi-interquartile range of the following set of numbers. 63, 65, 76, 65, 63, 51, 52, 95, 63, 71, 83.

   (3mks)

4. Solve the equation.

   (3mks)

   $\log (3x-1)=\log (2x+1)-\log 4$

5. Rationalize the denominator (3mk)

$$\frac{\sqrt{5} + \sqrt{3}}{\sqrt{7} - \sqrt{3}}$$

6. (i) Write down the first 4 terms in a seconding power of x in the expansion of

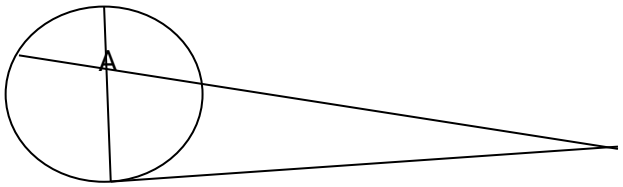
$(1-2x)^5$ (2mks)

(ii) Use your expansion to estimate the value of $(0.96)^5$ (2mks)

7. Make q the subject of the formula
(3mks)

$$T = \left(\frac{b - q}{q}\right)^{½}$$

8. In the figure below, PT is a tangent to the circle of T. PQ = 9cm, SA =6cm, AT = 8 cm and AR = 3 cm.



Calculate the length of

(i) AQ (2mks)

(ii) PT (2mks)

9. Solve the simultaneous equations (4mks)

$x^2 + xy = 4$

$y - x = 2$

10. An arithmetic progressive whose first term is 2 and the n^{th} term 32 has the sum of n terms equal to 357. Find n. (3mks)

11. PQR is a triangle of area $9cm^2$. If PQ is the fixed base of the triangle and is 6cm long. On the upper side of PQ.

    Draw Δ P QR and describe the locus of point R (3mks)

12. Use matrix method to solve.
(3mks)

$b = 4a + 6$

$3a - 2b = -2$

13. State the amplitude and the period of the wave $y = 3 \sin\frac{3}{4}\theta$
(2mks)

14. Find the centre and radius of the circle whose equation is $4x^2 - 12x + 4y^2 - 8y - 3 = 0$ (3mks)

15. Twenty men can dig a trench 300m long in 15 days. Find the number of days it would take 30 men to dig a trench 360m long.
(3mks)

16. Use logarithms to evaluate $\frac{1.76\sqrt[3]{0.2876}}{379.5}$

(3mks)

SECTION II

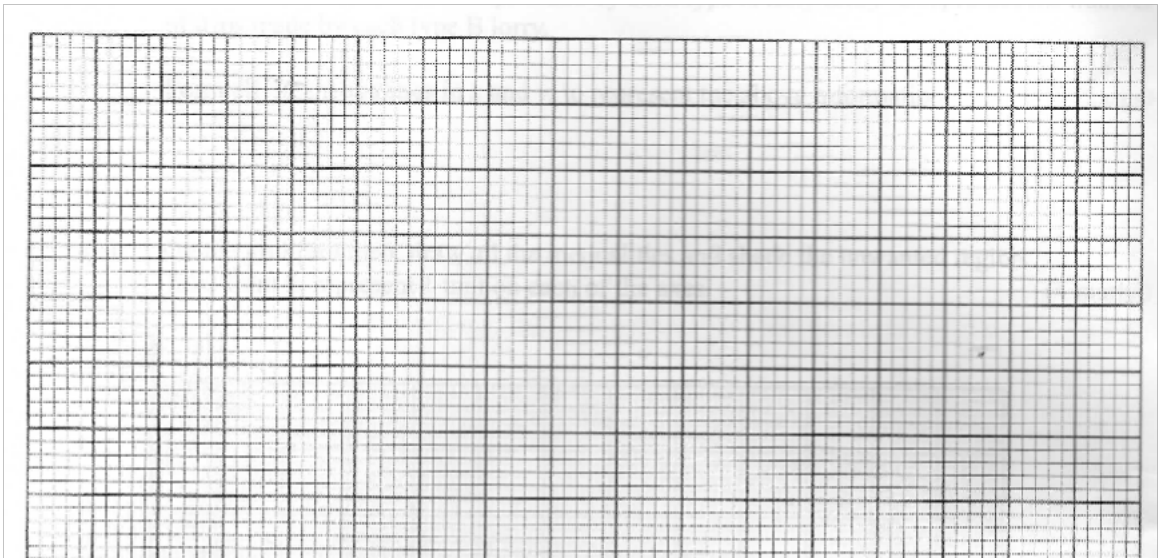
Answer any FIVE questions only.

17. The table below shows the marks scored by students in a mathematics test.

Marks	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No of students	3	5	6	21	12	6	4	2	1

(a) From the table above, determine the 25^{th} percentile
(2mks)

(b) On the grid provided, draw an Ogive curve that represents the above information.
(4mks)



(c) Using the graph above

(i) Determine the pass mark if 45% of the students passed.
(2mks)

(ii) If the pass mark was to be pegged at 60%. How many students passed?
(2mks)

18. Three qualities P, Q and R are such that P varies directly as Q inversely as the square root of R.

Given that P = 2250 when Q = 450 and R = 64

(a) Write down an equation connecting P, Q, & R
(4mks)

(b) If Q decreased by 16% and R increased by 44%.

Calculate the percentage change in P
(3mks)

(c) In a soccer competition the number of goals (G) scored in a penalty shoot-out is partly constant and partly varies as the skill (S) of the player. Given that when S= 1 and G= 6 when S= 2 G=4.find the value G when S =3
(3mks)

19. The cost of a minibus was sh 950000. It depreciated in value by 5% per year for the first two years and by 15% per year for subsequent years.

(a) Calculate the value of the minibus after 5 years. (4mks)

(b) After 5 years, the minibus was sold through a dealer at 25% more than its value to Mr. Nyeri. If the dealer's sale price was to be taken as its value after depreciation, calculate the average monthly rate of depreciation for the 5years.
(6mks)

20. A trader deals in two types of rice .Type P & Q .Type P costs ksh 1600 per bag and type Q sh 1400 per bag

(a) The trader mixes 30 bags of type P & 50 bags of type Q. If he sells the mixture at a profit of 20%,

Calculate the selling price of one bag of the mixture.
(4mks)

(b) The trader now mixes type P with type Q in the ration x:y respectively. If the cost of the mixture is ksh 1534 per bag, find the ration.
(4mks)

(c) The trader mixes one bag of the mixture in part (a) with one bag of the mixture in part (b) above.

Calculate the ration of type P rice to type Q rice in this mixture. (2mks)

21. A point D' A' and Y' are images of triangle DAY with vertices D (4, 4) A (0,2) and Y(-2,4) respectively under a transformation given by matrix $P=\begin{pmatrix}2 & 1\\1 & 1\end{pmatrix}$

Determine the co-ordinates of D', A' and Y'
(3mks)

(b) Triangle D'' A'' Y'' is the image of triangle D' A' Y' under another transformation whose

matrix is Q=$\begin{pmatrix} -1/2 & 0 \\ 0 & -1/2 \end{pmatrix}$

Determine the coordinates of D'' A'' Y'' (3mks)

(c) Find a single matrix of transformation that maps D" A" Y" onto triangle D A Y
(2mks)

(d) A plane figure whose area is 20cm^2 undergoes transformation represented by QP. Find the area of image.
(2mks)

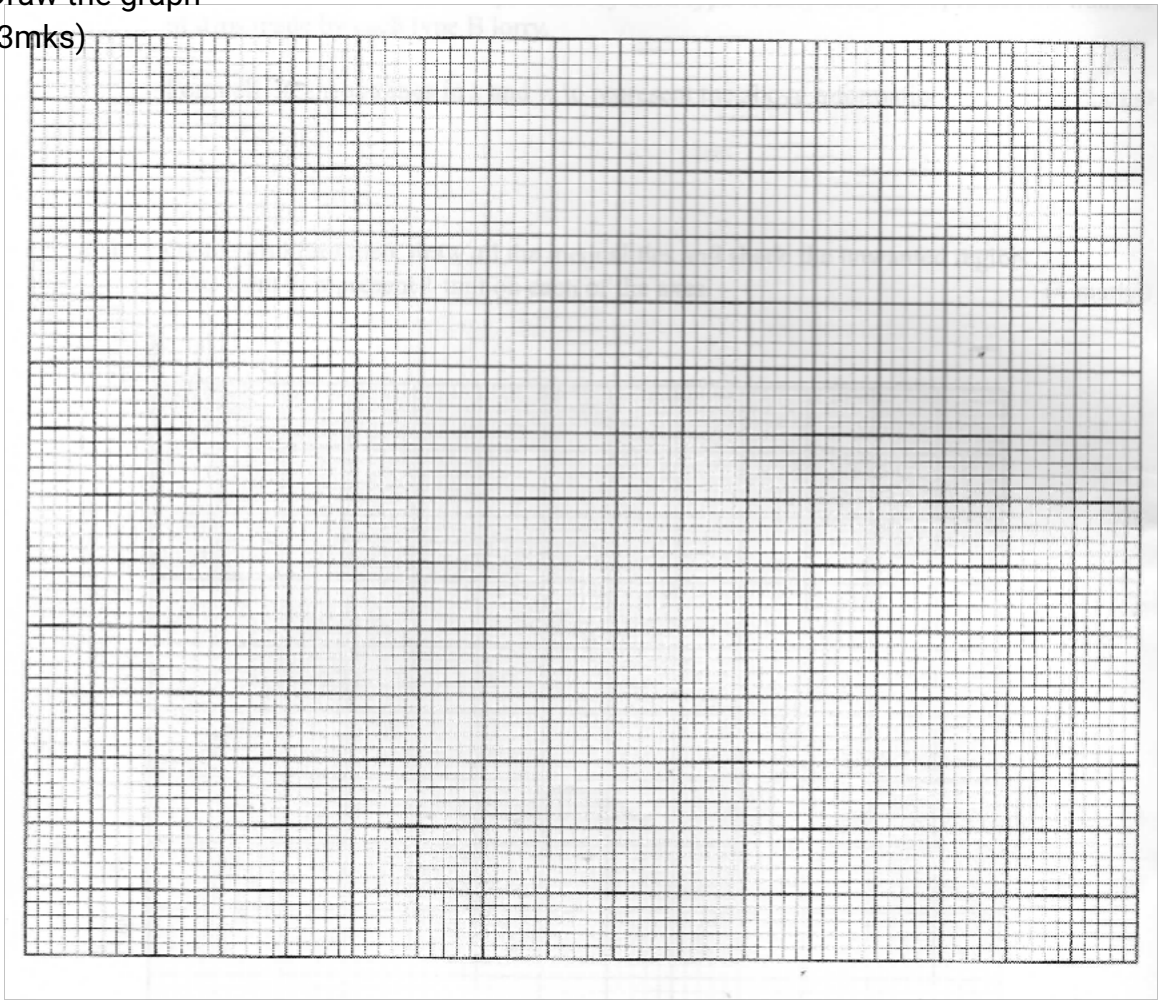
22. (a) Complete the table below for the function

Y = 1 + 3 x- 2x ^{2} – x^3

x	-3	-2	-1	0	1	2
-x^3	+27			0	-1	
-2x^2		-8		0	-2	
1+3x				1		7
y	1			1		

(2mks)

(b) Using a scale of 2cm represent 1 unit on the x-axis and 1 cm represent 1 unit on y-axis. Draw the graph
(3mks)



(c) By drawing a suitable line graph; solve the equation

$$X^3 + 2x^2 - 5x - 6 = 0$$

(3mks)

(d) Find the co-ordinates of the turning points.
(2mks)

23. Patients A and B are to be tested for covid - 19 virus. The probability that A will be

positive is 0.6 and that B will be negative is 0.2

Find the probability that

(a) Both will be positive
(2mks)

(b) Neither will be positive
(2mks)

(c) One will be positive
(2mks)

(d) At least one will be positive
(2mks)

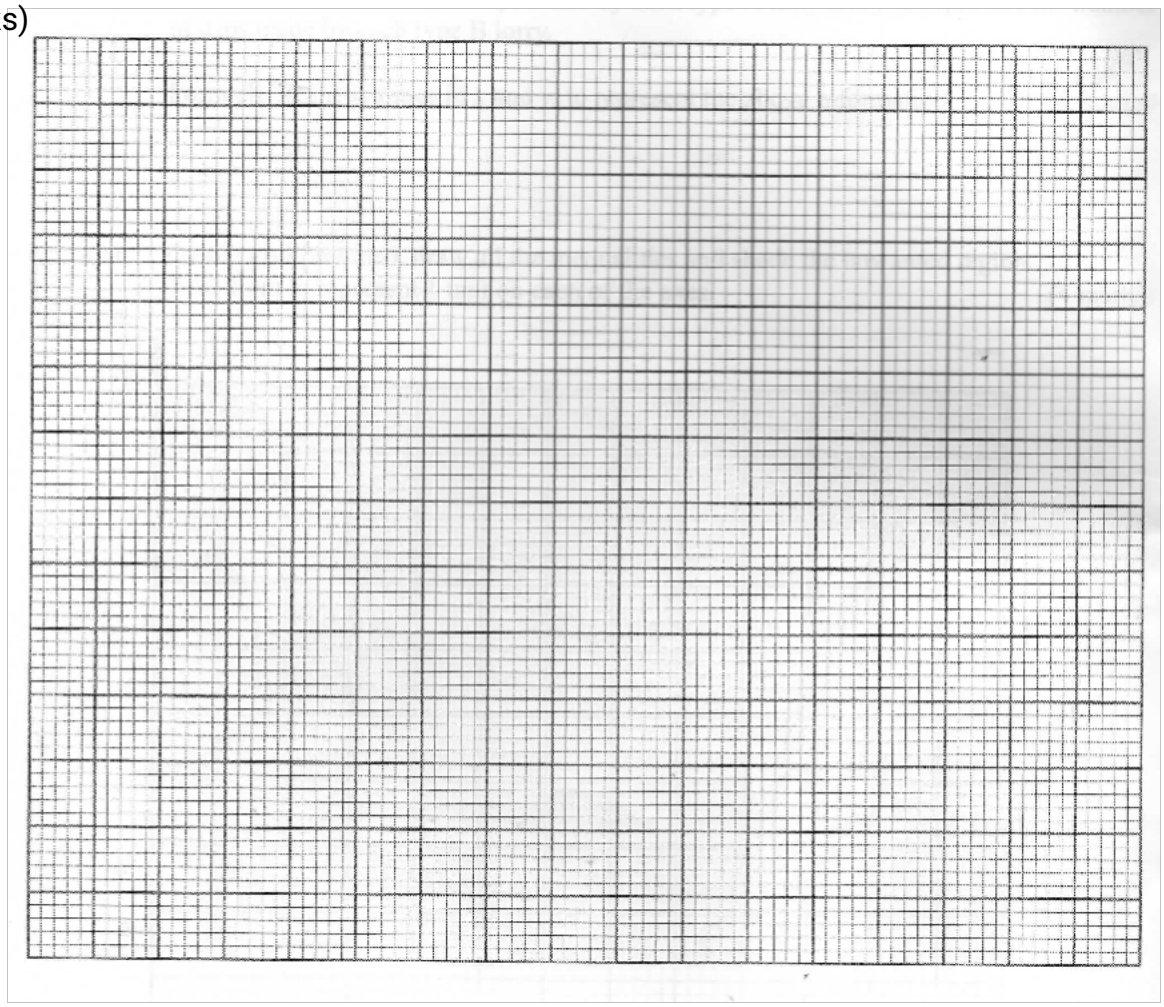
e) At least B is negative. (2mks)

24. (a) Complete the table below

x	0	30	60	90	120	150	180	210	240	270	300	330	360
Sin x	0		0.87		0.87		0		-0.87	-1		-0.5	
2 sin (x+30)	1	1.73	2		1	0					-1		

(2mks)

(b)On the same axes, draw the graphs of y = sin x and y = 2 sin (x+30) $0^0 \leq x \leq 360^0$
(5mks)



(c) From the graph, find the roots of

$$2 \sin (x + 30) - \sin x = 0$$

(1mk)

(d) Describe fully the transformation that maps the graph of

Y = sin x onto that of Y = 2 sin $(x + 30^0)$

(2mks)