NAME……..ADM. NO……CLASS…….

DATE…….

121/1
MATHEMATICS
PAPER 1
Term 2
TIME: 2½ HOURS

Kenya Certificate of Secondary Education
MATHEMATICS
PAPER 1
TIME: 2½ HRS.

INSTRUCTION TO CANDIDATE'S:

1. *Write your **name**, **admission number, class** and **date** in the spaces provided above.*
2. *This paper consists of **two** Sections; Section **I** and Section **II**.*
3. *Answer **ALL** the questions in Section **I** and any **five** questions from Section **II**.*
4. *All answers and working must be written on the question paper in the spaces provided below each question.*
5. *Show all the steps in your calculation, giving your answer at each stage in the spaces provided **below** each question.*
6. *Marks may be given for correct working even if the answer is wrong.*
7. *Non-programmable silent electronic calculators and KNEC Mathematical tables **may be** used, except where stated otherwise.*
8. *Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.*
9. *Candidates should answer the 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)
Answer all the question in this section in the spaces provided.

1. Without using a calculator , evaluate: $\frac{\frac{3}{4}+1\frac{2}{7}\div\frac{3}{7}\,of\,2\frac{1}{3}}{\frac{2}{3}\left(1\frac{2}{7}-\frac{3}{8}\right)}$ (3 mks)

2. Simplify completely. $\frac{3x^2-xy-2y^2}{18x^2-8y^2}$ (3 mks)

3. The price of an article is marked as 12,000/= Mr. Omanga sold the article at a discount of 10% and still made a profit of 8%. Calculate the cost of the article. (3 mks)

4. Three sirens wail at intervals of thirty minutes, fifty minutes and sixty minutes. If they wail together at 7.18 a.m. on Monday, what time and day will they wail together? (3 mks)

5. The table shows the frequency distribution of marks scored by students in a test.

Marks	Frequency
21 - 30	2
31 - 40	4
41 - 50	11
51 - 60	5
61 - 70	3

Determine the median mark correct to one decimal point. (3 mks)

6. A cylindrical solid whose radius and height are equal, has a total surface area of $154cm^2$. Calculate the diameter. (3mks).

7. The exterior angle of a regular polygon is $(\chi - 50)°$ and the interior angle is $(2\chi + 20)°$. Find the number of sides of the polygon. (3 mks)

8. Solve the following inequalities and represent it on the number line.
$6x + 2 < 3x + 11 \leq 27x - 1$ Write down the integral values that satisfy the inequality.
(3mks)

9. Find the equation of a line through the point (2, 1), perpendicular to the line $\frac{1}{2}x + 2y = -3$
(3 mks)

10. Find the value of x given that; $9^x + 2 \times 3^{2x} - 243 = 0$ (3mks).

11. The position vectors of A and B are given as OA = 2**i** – 3**j** + 4**k** and OB= -2**i** – **j** + 2**k** respectively. Find to 2 decimal places, the length of vector **AB**. (4 mks)

12. Use the exchange rates below to answer the question.

	Buying	Selling
1 us Dollar	63.00	63.50
1 Euro	125.30	125.43

A tourist arriving in Kenya from Britain has 9600 Euros. He converts the Euros to Kenya shillings at a commission of 5%, while in Kenya he converts the money to US dollars. If he was not charged any commission from the last transaction, calculate to the nearest USA dollar what he received. (3mks).

13. Given that $\sin(2x - 10)^o = \cos 60^o$ and x is an acute angle, find x. (3 mks)

14. The length of a rectangle is (3x+1)cm. Its width is 3cm shorter than the length. Given that area of the rectangle is $28cm^2$, find its length. (3 mks)

15. The mass of two similar solid are 324g and 768g. Find
    a) height of the smaller solid if the height of the bigger solid is 20cm. (2 mks)

    b) the surface area of the smaller solid if the surface area of the bigger solid is $40cm^2$. (2 mks)

16. The cost of three pens and five books is sh. 130. Kanyoro bought 2 of the pens and 3 of the books at sh. 80. How much did he pay for each? (3mks)

SECTION II (50mks)

Answer only *five* questions in this section in the spaces provided.

17. A bus left Nairobi at 7a.m and travelled towards Eldoret at an average speed of 80km/h. At 7:45 a.m a car left Eldoret towards Nairobi at an average speed of 120 km/h. Given that the distance between Nairobi and Eldoret is 300km,
Calculate:

(a) The time the bus arrived at Eldoret. (2 mks)

(b) The time of the day, the two met. (3 mks)

(c) The distance from Nairobi to where the two met. (2 mks)

(d) The distance of the bus from Eldoret when the car arrived in Nairobi. (3 mks)

18. The following measurements were recorded in a field book using XY as the base line.
XY = 400m.

		Y		
C	60	340		
		300	120	D
		240	160	E
		220	160	F
B	100	140		
A	120	80		
		X		

(a) Using a scale of 1: 4000, draw an accurate map of the farm. (4 mks)

(b) Determine the actual area of the farm in hectares. (4 mks)

(a) If the farm is on sale at sh.80,000 per hectare, find how much the farm costs.
(2 mks)

19. Mr. Omwega is employed. His basic salary is Kshs. 21, 750 and is entitled to a house allowance of Kshs 15, 000 and a travelling allowance of Kshs 8, 000 per month. He also claims a personal monthly relief of Kshs 1, 056 per month. Other deductions are; Union dues Kshs 200 and Co-operative shares Kshs 4, 500 per month.
The table below shows the tax rates for the year.

Income (Kshs per annum)	**Tax rates**
1 – 116, 600	10%
116, 161 – 225, 600	15%
225, 601 – 335, 040	20%
335, 041 – 444, 480	25%
Over 444, 480	30%

Calculate;

a) Mr. Omwega's annual taxable income. (2 mks)

b) The tax paid by Mr. Omwega in the year. (6 mks)

c) Mr. Omwega's net income per month. (2 mks)

20. A straight line L_1 has a gradient $-\frac{1}{2}$ and passes through point P (-1, 3). Another line L_2 passes through the points Q (1, -3) and R (4, 5). Find.

(a) The equation of L_1. (2 mks)

(b) The gradient of L_2. (1 mk)

(c) The equation of L_2. (2 mks)

(d) The equation of a line passing through a point S (0, 5) and is perpendicular to L_2 (3 mks)

(e) The equation of a line through R parallel to L_1. (2 mks)

21. A ship leaves port P and sails to port Q which is 80km away on a bearing of 040^{o}. The ship then sails from Q to R on a bearing 160^{o} where R is 150km from Q. From R, the ship returns directly to P at a speed of 25km/h.

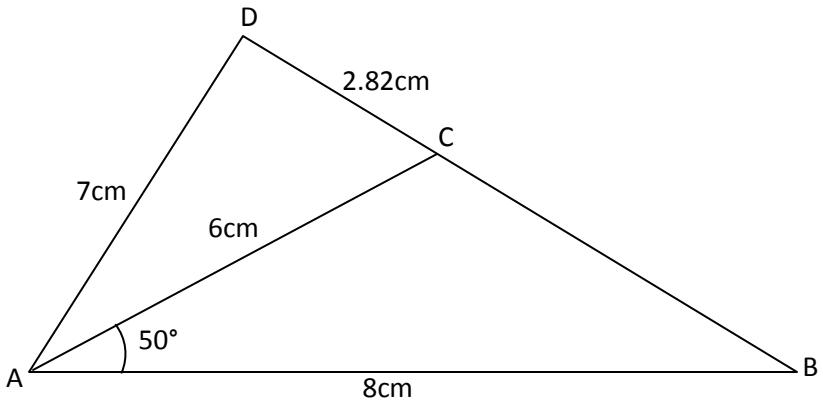
a) Using a suitable scale show the relative positions of P, Q and R. (3 mks)

b) Find the bearing of R from P (2 mks)

c) Find the distance travelled from R and the time taken to arrive at the destination(3 mks)

d) An island S is equidistant from P, Q and R. Show its relative position. (2 mks)

22. In the figure **below** (not drawn to scale) AB = 8cm, AC = 6cm, AD = 7cm, CD = 2.82cm and angle CAB = 50°.



Calculate (to 2d.p.)

a) The length BC. (3 mks)

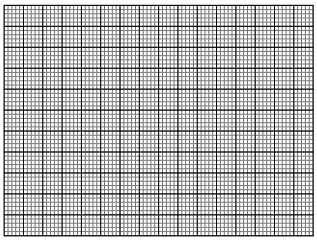
b) The size of angle ABC. (3 mks)

c) Size of angle CAD. (2 mks)

d) Calculate the area of triangle ACD. (2 mks)

23. Complete the table for the function $y = 1 – 2x - 3x^2$ in the range $-3 \leq x \leq 3$ (2 mks)

X	-3	-2	-1	0	1	2	3
$-3x^2$	-27		-3	0		-12	
-2x		4		0			-6
1	1	1	1	1	1	1	1
Y	-20			1		-15	



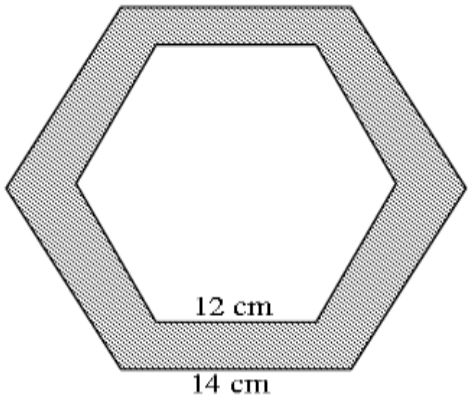
b) Using the table above and the graph paper provided, draw the graph of $y = 1 – 2x –3x^2$ (4 mks)

c) Use the graph in (b) above to solve

i) $1 – 2x – 3x^2 = 0$ (2 mks)

ii) $2 – 5x – 3x^2 = 0$ (2 mks)

24. The diagram below (not drawn to scale) shows the cross – section of a hexagonal solid metal prism length 20cm.



Calculate;

a) The area of the shaded region (Take hexagon to be regular). (5 mks)

b) The volume of the material used to make the metal in cm^3. (2 mks

c) If the density of the metal prism is 3.5 g/ cm^3, find its mass in kg. (3 mks)