NAME:……………………………………………………....ADM NO:…………………

SCHOOL …………. ………….CLASS: ……………

SIGNATURE:………………………

DATE:………………………..

121/2
MATHEMATICS
PAPER 2
DECEMBER 2021
2 ¹/₂HRS

MOKASA 2EXAMINATION 2021
Kenya Certificate of Secondary Education (K.C.S.E) Trial Exam
MATHEMATICS PAPER 2
2 ¹/₂HRS

INSTRUCTIONS

- *Write your **name**, **school** ,**class and Admission number** in the spaces provided above.*
- *Sign and write date of examination in the spaces provided above*
- *This paper consist of **two** sections; Section **I** and Section **II***
- *Answer **all** questions in **section I** and only 5 questions from **Section II***
- *Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each questions*
- *Marks may be given for correct working even if the answer is wrong*
- ***Non- programmable** silent electronic calculators and **KNEC** Mathematical tables may be used, except where stated otherwise.*

For Examiners 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	

1.Simplify the following expression.   (3 marks)
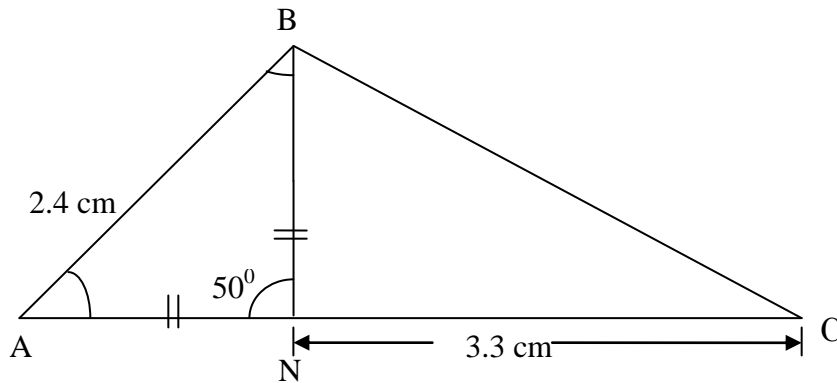
$$2x - \frac{x-5}{4} - \frac{3x-1}{2}$$

2.In the figure below   (3marks)
     NC=3.3cm and AB =2.4cm

Find the area of triangle ABC

3.Calculate the percentage error in volume of a cylinder whose diameter is 17.5cm and its height is 32.5cm.   *(3 marks)*

4.Evaluate without using mathematical tables or a calculator.

(4marks)

$$\frac{1}{1+Cos\ 45} + \frac{1}{1-Sin\ 45^0}$$

5.The roots of a quadratic equation are x= $-\frac{2}{3}$ and x =4.Form the quadratic equation in the of ax²+bx+c=0 where a, b, and c are intergers   (3 marks)

6.What is the length of an arc which subtends an angle of 0.8 radians at the centre of circle given its circumference to be 66 cm.   (3marks)

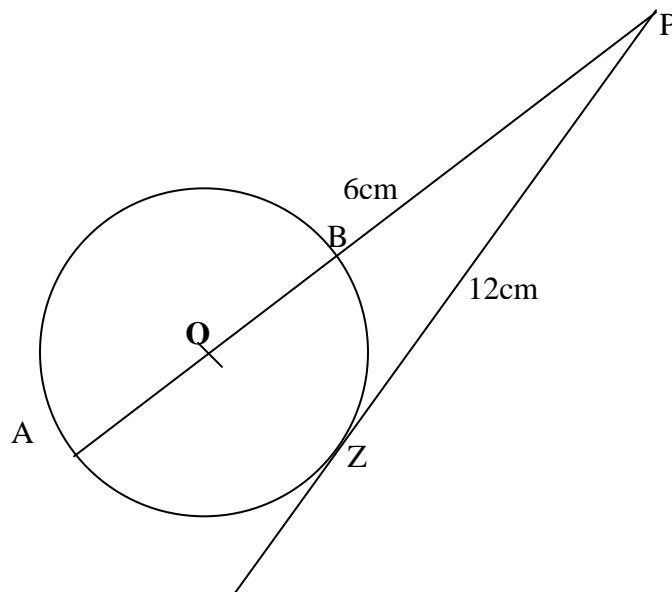7.Solve for x in the equation;   (3marks)

$$\log 5 - 2 + log(2x + 10) = log(x - 4)$$

8.Make x the subject of the formula   (3marks)

$$b = \frac{C\sqrt{x^2 - 1}}{x}$$

9.In the given figure, O is the centre of the circle and AOBP is a straight line. PZ is a tangent to the circle. If PZ = 12cm and BP = 6cm. find the radius of the circle.   (3marks)

10.Find the equation of the normal to the curve y = x2 + 4x -3 at the point (1, 2).

(3marks)

11. Using the assumed mean of 50 determine the variance of the following set of numbers

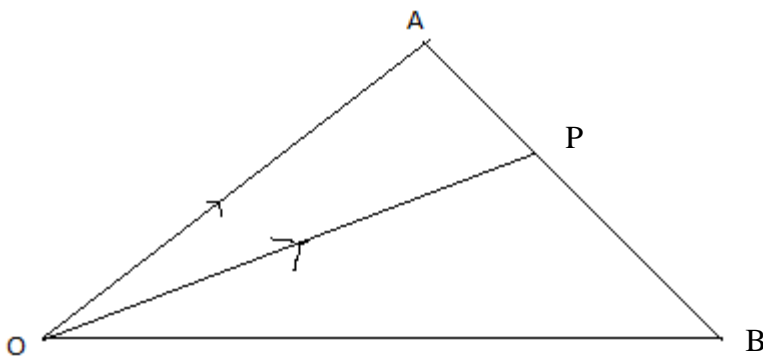   52, 45, 42 ,59 , 50 , 56 ,46   (3marks)

12. Solve the following simultaneous equations using matrix method.   (3marks)

     -3y +2x = 7

     4x +3y = 5

13. Given that $\boldsymbol{OA} = \boldsymbol{a}$, $\boldsymbol{OB} = \boldsymbol{b}$ and that P divide AB in the ratio 3 : -1 Express $\overrightarrow{OP}$ in terms of vectors **a** and b   (3marks)

14. A solid consists of a cylinder and hemisphere of equal radius 10.5cm if the height of the solid is 30 cm find its capacity . (3marks)

15. The lines x + 2y = -1 and 2x + 2y = 3 intersect at a point R. Find the equation of a circle, centre R, radius 5, giving your answer in the form $x^2 + y^2 + gx + fy + c = 0$, where g, f and c are constants. (3marks)

16. Expand and hence find the constant term in the binomial expansion (4marks)

$$\left[2x - \frac{1}{x}\right]^4$$

17.A teacher in a certain school earns ksh.19620 per month. He is also paid a house allowance of sh. 20000 per month and medical allowance of 2476 and commuter allowance of sh.318.In addition to income tax he is deducted sh.392.40 towards a widow and children pension scheme (WCPS) and monthly life insurance premium of ksh.1250.He is entitled to personal tax relief of sh.1162 per month and insurance relief of 10%of premium paid.

Monthly taxable income sh. pm	Rate of tax in %
0 - 10164	10
10165 -19740	15
19741 -29316	20
29317 -38892	25
Over 38892	30

a)Determine the teachers taxable income per month.   (2 marks)

b) Calculate the tax paid by the teacher each month.   (5marks)

c)Find the teachers net income per month   (3marks)

18.An aircraft leaves airport $P(50^0N, 5^0W)$ and flies due west for 2400 km to point Q, then 1500 km due south to point R. given that the radius of the earth is 6370 Find

a)the position of point Q

(3marks)

b)the position of point R

(3marks)

c)A ship leaves Mombasa $(4^0S, 40^0E)$ and sails due east for 30 hours to point

 $Q(4^0S, 52^0E)$ in the Indian ocean. Find the average speed of the ship in knots.
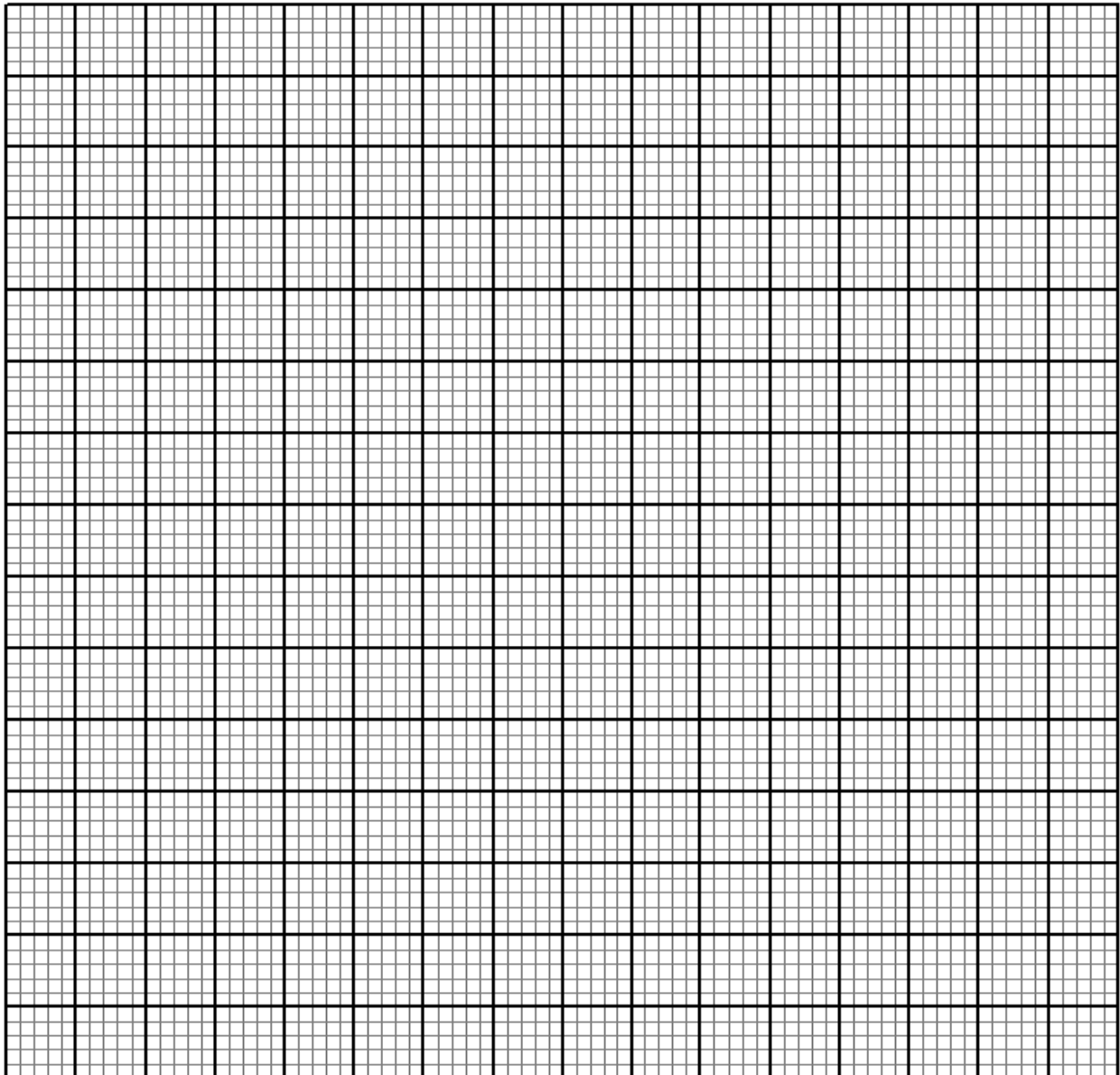
(4marks)

19. The table below shows marks scored by applicants for various positions in an interview.

Marks	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89
No. of people	4	18	22	24	16	12	4

     (a)   Draw an ogive to represent the given data.   (4 marks)

(b) Using your ogive estimate;

      (i)   the median   (1 mark)

(ii)   the quartile deviation.   (3 marks)

(iii) the range of marks scored by the middle 40% of applicants .   (2 marks)

20. A die is biased so that when tossed the probability of anumber n showing up is given by p(n)=Kn where k is a constant and n=1,2,3,4,5 and 6(the number on the faces of the die)

a) Calculate the value of K   (2marks)

b)What is the probability of getting a number greater than 4 .   (2marks)

c)What is the probability of getting an even number .   (2 marks)

d) If the number is rolled twice what is the probability that the sum of the numbers showing up is atleast 11.   (4marks)

21. Three consecutive terms of geometric progression are 9^{2x+1}, 81^x and 729 respectively. Calculate:

   (a) The value of x

(3marks)

  (b) Find the common ratio

(2marks)

  (c) Calculate the sum of the first 10 terms of this series

(2marks)

 (d) Given that the fifth and the sixth terms of this G.P forms the first two consecutive terms of arithmetic sequence, calculate the sum of the first 20 terms of this sequence. (3marks)

22. Using a ruler and pair of compasses only, construct a parallelogram PQRS such That PQ = 7.5cm, PS = 5cm, and QPS = 67 ½^0.   (4marks)

On the same diagram, locate;
   a) locus X equidistant from P and Q.   (1 mark)

   b)A point M is such that<QMS = 90^0.   M is on the same side of QS as R.
                                                                          (2marks)

c)A region inside the parallelogram in which variable Y lies such that PY, RY and QYS $\geq$ 90^0, Shade the region represented by Y.   (3marks)

23.The diagram below shows a right pyramid with vertex V and a triangular base ABC which is an equilateral triangle of sides 6cm. The length of VA=VB=VC=20 cm .M is the mid point BC. Point O is at the base and vertically below
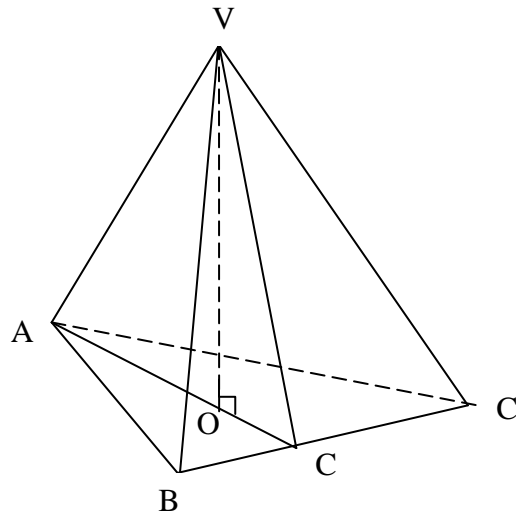
a) Calculate the length of line AM   (2 marks)

b)Calculate the angle the line VA makes with the base ABC.   (2marks)

c)Find the angle between the face VBC and the base ABC.   (3 marks)

d).Find the volume of the pyramid   (3 marks)

24. A Lady sells two types of ice creams in cups and sticks. She can store less than ten packets in her cooling box. She sells more cups than sticks but less than 3 items as many cups as sticks. She also knows that she will sell more than 3 packets of sticks. Her profit is Ksh. 8 on a packet of cups and Ksh. 5 on a packet of sticks.

(a) Form inequalities to represent the above information: *(3 marks)*

Let x – packets of cups and y – packets of sticks

(b) On the grid provided graph the inequalities and show region R that satisfy the required condition. *(4 marks)*
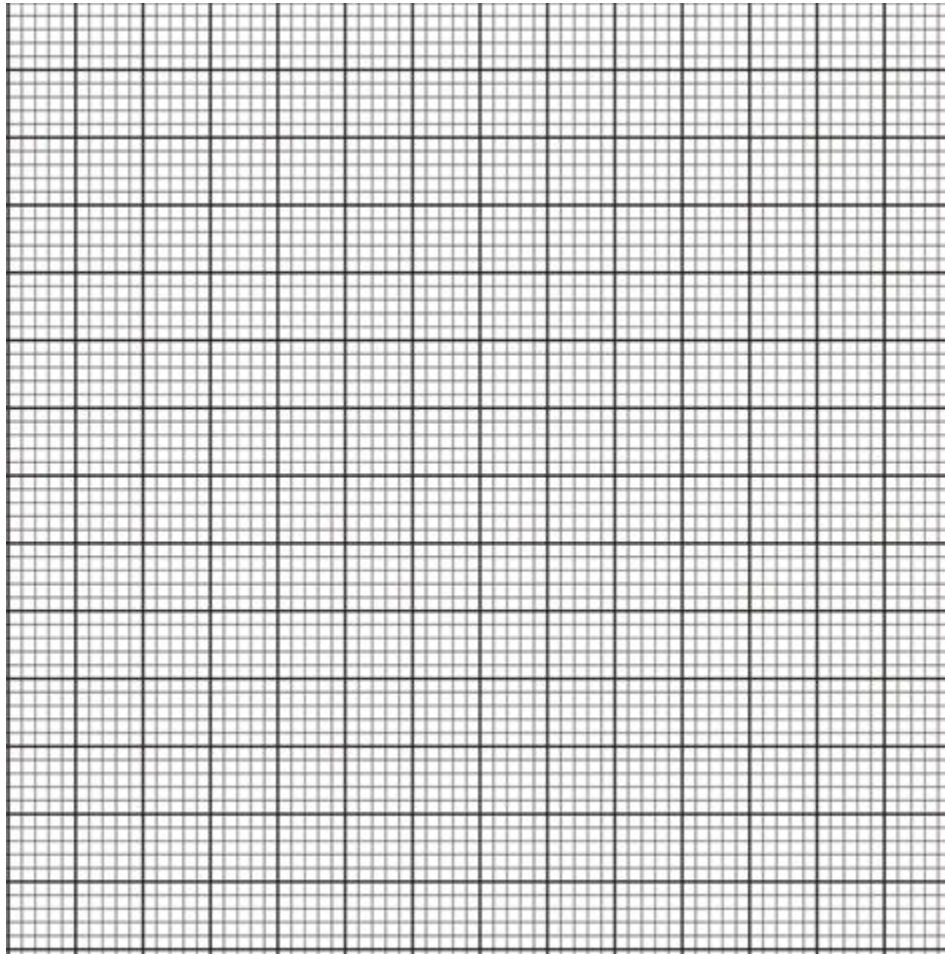
(c) How many packets of cups and sticks should the lady put in her box to give her the maximum profit? *(3 marks)*