Name: ……Class: …… Adm.No……

School: …… Date: ……

Sign:……

**121/1**
**MATHEMATICS**
**PAPER 1**
**TIME: 2 ½ HOURS**

**SUKELLEMO MOCK E X A M I N A T I O N - AUGUST 2022**
**Kenya Certificate to Secondary Education**
**MATHEMATICS (PAPER 1)**
**TIME: 2 ½ HOURS**

**Instructions**

- *Write your name, class, admission number, school, date and signature in spaces provided above.*
- *The paper contains **two** sections **I** and **II.***
- *Answer **all** questions in section **I** and **any five** questions from section **11** in the spaces provided below each question.*
- *Show all the steps in your calculations giving your answers at each stage in the spaces below each question.*
- *Non-programmable silent electronic calculator and mathematical tables may be used except where stated otherwise.*



**For Examiner's Use Only**

**SECTION A**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | |

**SECTION B**

| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

**PERCENTAGE**

**SCORE**

## SECTION I (50 MARKS)

*Answer **all** the questions from this section*

1. Without using mathematical tables or calculator, evaluate. (3marks)

$$\frac{8-42}{17} - \frac{9-(-3)(-10)}{13}$$

2. Use the reciprocal tables to evaluate and square tables to evaluate:

$$\frac{3}{123.4} + 0.9829^2$$ (3 marks)

3. Simplify $\left(\frac{27}{125}\right)^{-2/3} \times \left(\frac{16}{81}\right)^{3/4}$. (3 marks)

4. Find the integral values of x which satisfy the inequalities. (3marks)

$3x - 2 < 10 + x < 2 + 5x$

5. The length of three wires are 36m, 48m and 72m. pieces of wire of equal lengths were cut from the three wires, calculate the least number of pieces obtained (3 marks)

6. Using the ruler and a pair of compasses only. Construct a rhombus WXYZ, given that WX=6cm and WY=7.9cm, what is the size of angle XYZ? (4 marks)



7. A curve is given by $y=2x^3 -3x^2 -12x +12$
   a) Find the gradient function of the curve (1 mark)

   b) Determine the equation of the normal and the tangent at the point (1,-1), in the form y=mx +c , where m and c are constants (3 marks)

8. Judith cycles to school a distance of 18km at a speed of x km/h. On one day, when the wind was behind her, her speed was (x +2)km/h and she took 18 minutes less than her normal time to reach school. Find $x$. (4marks)

9. A salesman gets a commission of 2.4% on sales up to Sh. 100,000. He gets additional commission of 1.5% on sales above this. Calculate the commission he gets for sales worth Sh. 280,000. (3mks)



10. Simply $\frac{x-2}{x+2} - \frac{2x+20}{x^2-4}$ (4 marks)

11. Solve $Cos(2x + 30) - Sin\,(3x - 40) = 0$. (3 marks)

12. A regular polygon is such that its exterior angle is one eighth the size of interior angle. Find the num ber of sides of the polygon. (3 marks)

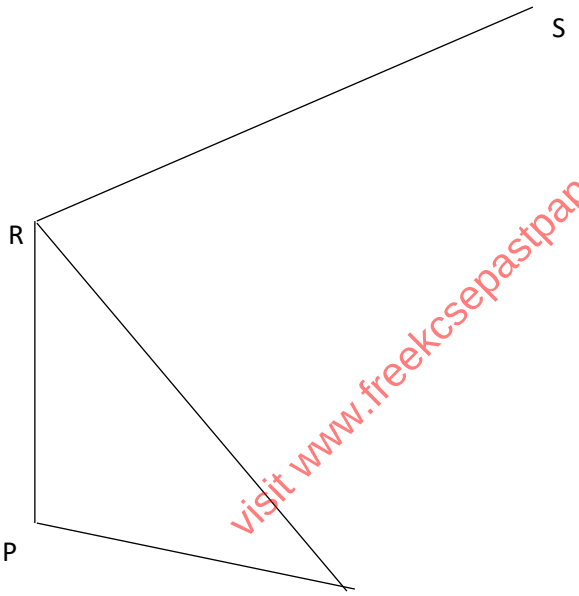
13. A chemist had 60cm$^3$ of solution containing 25% of water. If $y$ cm$^3$ of the solution is poured away and replaced with the same amount of water, the resulting solution is 50% water. Determine the value of $y$. (3marks)



14. Under an enlargement scale factor -2, the image of A( 2 ,4) is A'(-1 ,-2). Under the same enlargement, the image of D( x ,y) is D'(3, -2). Find the coordinates of the object D. (3 marks)

15. The sum of the digits of a two digit number is 15. When the number is subtracted from the number formed by reversing the digits, the difference is 27.Find the number. (4marks)

***16.*** The figure below shows a solid wedge PQRSTU. Complete the solid showing all the hidden edges with dotted lines. (3mks)



## SECTION II (50 MARKS)

*Answer **FIVE** questions **ONLY** from this section*

17. B is 210km on the bearing of $078^0$ from A. C is 320km at a bearing of $S38^0W$ of B. D is 240km and bearing of $212^0$ from C. using 1cm to represent 50km, determine

(a) The position of turns A, B, C and D. (4 marks)



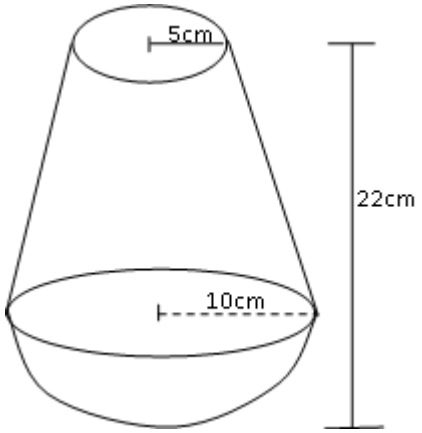
(b) The distance and bearing of A from C. (2 marks)

(c) The distance and bearing of B from D. (2 marks)

(d) The distance and bearing of A from D. (2 marks)

18. The figure below is partly a frustum and partly a hemispherical. The upper part is open. The container has a radius of 5cm and 10cm respectively while its height from the ground is 22cm. Find

(a) The slanting length of the frustum part. (2 marks)




(b) The surface area of the container. (4 marks)

(c) The volume of the container. (4 marks)

19. Find the inverse ofmatrix $A = \begin{pmatrix} 5 & 6 \\ 7 & 9 \end{pmatrix}$. (2marks)

b) Okelo bought 5 physics book and six mathematics book for a total of Ksh.2440.Ali bought 7 physics book and 9 mathematics books for a total cost of ksh.3560.

i) Form a matrix equation to represent the aboveinformation. (1mark)

ii) Use matrix method to find the price of a physics book and that of a mathematic (3marks)



c) A school bought 36physics books and 50mathematics books. Adiscount of 5% wasallowed oneach Physics book whereas adiscount of 8 % was allowed on each Mathematics book. Calculate the percentagediscount onthe cost of all the books bought. (4marks)

20. The table below shows marks obtained by 40 form four students of Maji Nyingi Secondary School in Ukwala Township in Biology end term examination.

60 70 72 40 52 60 22 31 78 53

56 55 28 67 63 54 57 48 47 56

55 62 72 78 75 38 37 44 62 64

58 39 45 48 56 59 65 58 50 58

(a) Make a grouped frequency table using classes 20 -29, 30-39, 40-49 etc (2 marks)



(b) (i) State the modal class. (1 mark)

ii) Estimate the median of the data (2 marks)

(ii) On the graph paper provided draw both histogram and a frequency polygon on the same axe. (5 marks)

21. The position vector of A and B are $\begin{pmatrix}-4\\6\end{pmatrix}$ and $\begin{pmatrix}-8\\2\end{pmatrix}$ respectively. Point M is the midpoint of **AB** and N the midpoint of OA.

a) Find i) the vector **AB** (2 marks)

ii) The coordinates of points M and N (2 marks)

iii) The modulus of **NM** (3 marks)

b) The coordinates of a point C is (2,b). Vector CA is pareallel to vector OB. Determine the value of b. (3 marks)

**22.** A line $L_1$ passes through the points $(-2,3)$ and $(-1,6)$ and is perpendicular to $L_2$ at $(-1,6)$.

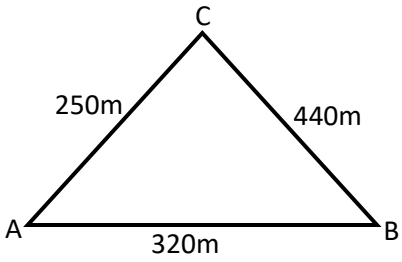
a) Find the equation of $L_1$. (2marks)

b) Find the equation of $L_2$ in the form $ax + by - c = 0$ where a, b and c are constants. (2marks)

c) Given that another line $L_3$ is parallel to $L_1$ and passes through point $(1,2)$, find the $x$ and $y$ intercepts of $L_3$. (3marks)

d) Find the point of intersection of $L_2$ and $L_3$. (3marks)

23. Karis owns a farm that is triangular in shape as shown below.




(a) Calculate the size of angle BAC (2 Marks)

(b) Find the area of the farm in hectares (3 Marks)

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

(i) Calculate the distance of the sprinkler from point C. (2 Marks)



(ii) 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 his farm that will be irrigated.
(3 Marks)

24. a) Use the trapezium rule to estimate the area under the curve $y = x^2 + x - 6$ over the interval $0 \leq x \leq 8$ using 8 trapezia. (3marks)

b) using mid-ordinate rule with four strips, estimate the area under the curve given above (2 marks)

c) Find the exact area under the curve in (a) above. (3mks)



d) Find the percentage error in the estimated area in (a) above. (2mks)