

NAME: .....INDEX NO:.....

SCHOOL: .....SIGN:.....

DATE: .....

**121/1**  
**Mathematics**  
**Paper 1**  
**2 ½ Hours**  
**JUNE- 2016**

**CENTRAL YEARLY MEETING OF FRIENDS (CYMF) -2016**  
**Kenya Certificate of Secondary Examination (KCSE)**

**121/1**  
**Mathematics**  
**Paper 1**

**INSTRUCTIONS TO CANDIDATES**

- a) Write your name, school and index number in the spaces provided above.
- b) Sign and write the date of the examination in the spaces provided above.
- c) This paper consists of **two** sections: **Section I** and **Section II**
- d) Answer **ALL** the questions in **section I** and only **FIVE** questions from **section II**.
- e) Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
- f) Marks may be given for correct working even if the answer is wrong.
- g) **Non – programmable**, silent electronic calculators **and** KNEC mathematical tables may be used, except where stated otherwise.
- h) 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**

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*This paper consists of 15 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

**SECTION 1: (50 MARKS)**

**Answer all question in this section in the spaces provided**

1. School fees charged in three day secondary schools this year compares as follows; school A charges  $\frac{3}{4}$  of fees charged in school B. School B charges twice the fees charged in school C. If school C charges Kshs 12,000, express fees charged in the three schools in the ratio of C:A:B. (3mks)

2. Simplify the expression  $\frac{a^2 - b^2}{a^2 + ab - a - b}$  (3mks)

3. Given that  $A = x^2 + 2xh$ , find the positive value of x when  $A = 360$  and  $h = 13$  (3mks)

4. A metal bar with a cross-sectional area of  $44\text{cm}^2$  has a mass of  $5.06\text{kg}$ . The density of the bar is  $2.3\text{g/cm}^3$ . Calculate the length, in cm, of the metal bar (3mks)

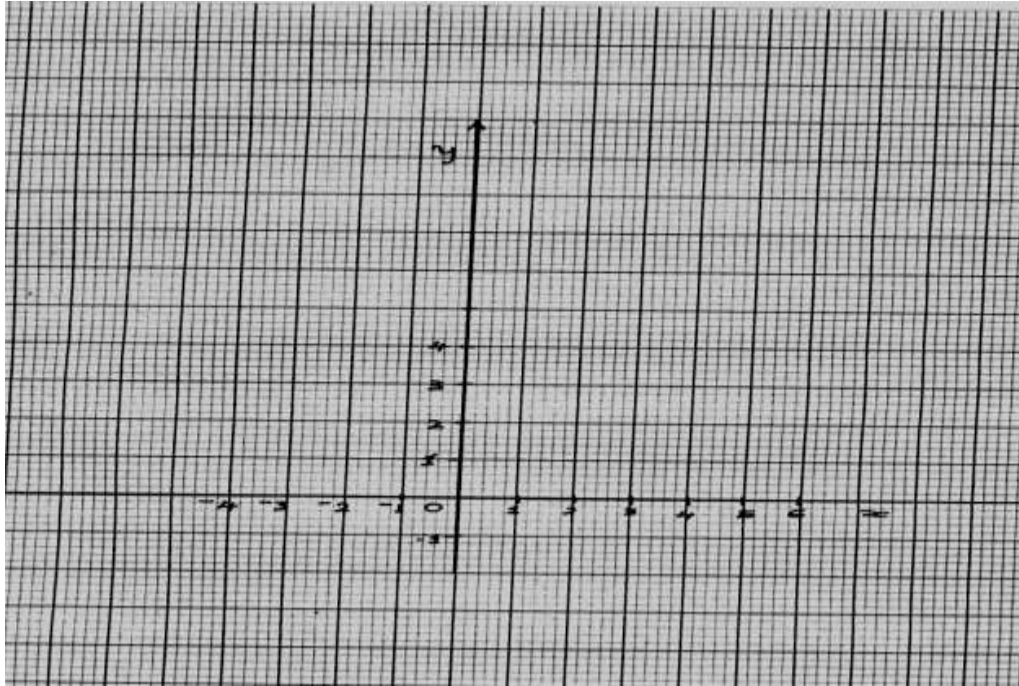
5. Baba Yao spent  $\frac{1}{5}$  of his salary on house rent,  $\frac{3}{8}$  on loan repayment, Ksh, 26,000 on domestic expenses and saved the rest. If he saved Ksh 8,000, calculate his monthly salary (3mks)

6. Given that  $\cos 60^\circ = \frac{1}{2}$ , without using mathematical tables or calculator, find , leaving your answers in surd form;

(a)  $\sin 60^\circ$  (2mks)

(b)  $\tan 30^\circ$  (1mk)

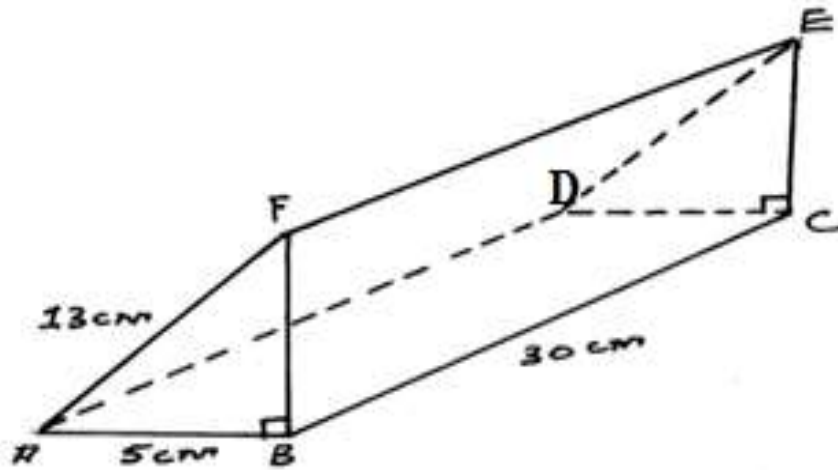
7. (a) The vertices of a triangle PQR are P(2,1),Q(5,1) and R(3,3).The triangle PQR is mapped onto triangle P<sup>1</sup>Q<sup>1</sup>R<sup>1</sup> by a translation  $T \begin{pmatrix} -4 \\ 0 \end{pmatrix}$ .On the grid provided below, draw the triangle PQR and its image P<sup>1</sup>Q<sup>1</sup>R<sup>1</sup>. (2mks)



- (b) State the type of congruence between the object and image triangle (1mk)

8. The volume of a hemisphere is 41.2cm<sup>3</sup>.Calculate ,correct to one decimal place, the radius of the hemisphere (3mks)

9. The figure below represents a triangular prism.  $AB=5\text{cm}$ ,  $AF=13\text{cm}$ ,  $BC=30\text{cm}$  and angle  $ABF$  is a right angle.



Calculate the total surface area (T.S.A) of the prism.

(3mks)

10. Solve the inequality given below and represent the solution on a number line

$$-5x - 3 > 2x + 4$$

(2mks)

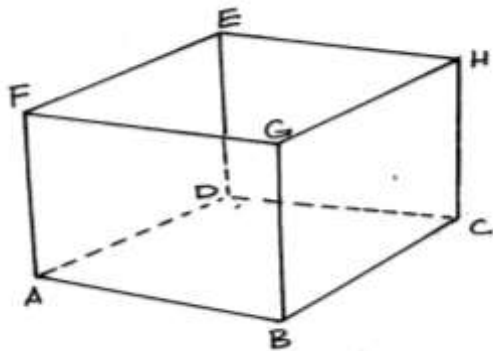
11. The sum of four consecutive odd numbers is 120. If  $X$  represents the smallest of the odd numbers, determine the four odd numbers (3mks)

12. The length of a rectangle is twice that of its width. If the area of the rectangle is  $200\text{cm}^2$ . Calculate (a) Calculate the length and width of the rectangle (2mks)

(b) the perimeter of the rectangle (2mks)

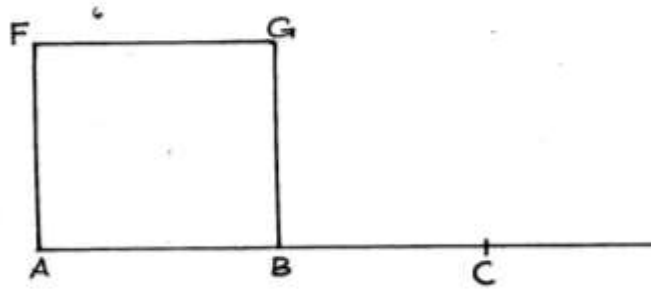
13. Three partners Ambia, Bela and Chaka raised Ksh 20,000, Kshs 30,000 and Kshs 50,000 respectively to start an M-Pesa business. After a while they realized a profit which they shared in the ratio of their contributions. If Ambia and Chaka received Kshs, 1050 in total. Calculate the total profit realized from the business. (3mks)

14. The figure shown below represents a cube of side 3cm. Ends ABCD and EFGH are open



Complete and label all the remaining vertices of the net of the cube below

(3mks)



15. Tinkeyi started her journey from town P at 8.00a.m. After walking for 12km at an average speed of 4km/h, she arrived at town Q. She stayed at town Q for 30 minutes. She then took a lift in a car which travelled at an average speed of 72 km/h and arrived at town R at 11.45 a.m. Calculate the distance between towns P and R via Q in kilometers (4mks)

16. A police station B is 60 km from town A on a bearing of  $045^{\circ}$ . A hospital C is 100km from the police station on a bearing of  $150^{\circ}$ .

(a) Using a scale drawing complete the drawing below to show the position of B and C. (2mks)



(b) Determine the distance, in kilometer, from town A to hospital C

(2mks)

**SECTION II(50 MARKS)**

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

17. A salesman sold 300 bags of maize to a retailer at Kshs .2000 each .He was given a commission of 3%.The salesman allowed a discount of 0.2% on the maize sold. This discount was deducted from his commission.
- (a) Calculate
- (i) The discount allowed (2mks)
- (ii) The net commission the salesman got (3mks)
- (b)The retailer sold all the bags of maize at Ksh, 2400 each and paid Ksh 12000 for transport. Calculate the profit made by the retailer (3mks)
- (c)In additions a value added tax (V.A.T)of 16 % was charged on the profit made by the retailer .Calculate the amount of tax collected. (2mks)



18. The base of an open rectangular tank is 3m by 2.5m and its height is 4m.

(a) Calculate

(i) The capacity of the tank in litres (3mks)

(ii) The total surface area, in  $\text{m}^2$  of the tank. (2mks)

(b) An open cylindrical tank has an equal capacity and same height as the rectangular tank in (a) above. Calculate correct to one decimal places;

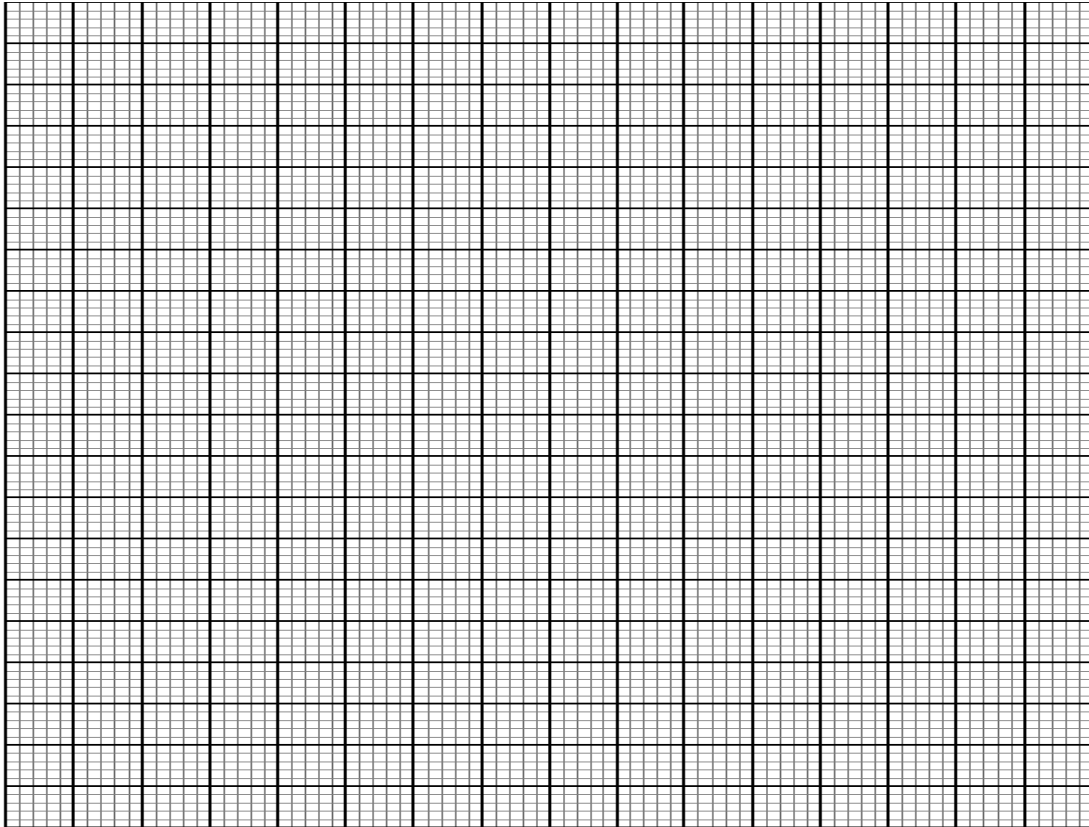
(i) The radius of the cylindrical tank (3mks)

(ii) The total surface area, in the  $\text{m}^2$ , of the tank (2mks)

19. Marks scored by students in a mathematics test were recorded in the frequency distribution table shown below;

Marks	21-30	31-40	41-50	51-60	61-70	71-80
No. of students	2	3	14	19	7	5

(a) On the grid provided below, draw a cumulative frequency curve (ogive) for the distribution in the table above (4mks)



(b) Use your graph to estimate

(i) The median mark (3mks)

(ii) Interquartile range (2mks)

(iii) Semi-interquartile range (quartile deviation) (1mk)

20. A piece of wire is bent to form a rectangle whose length is 6cm more than the width. The area of the rectangle formed is  $567\text{cm}^2$ .

(a) Determine the length of the wire (4mks)

(b) The same piece of wire could be bent to form a semi-circle. Determine the area that could be enclosed by the same semi-circle correct to one decimal place. (4mks)

(c) Express the area of the semi-circle as a percentage of the area of the rectangle, correct to 3 significant figures (2mks)

21. (a) Using a ruler and a pair of compasses only, construct triangle ABC and ABD on either side of line AB below, such that;  $\angle DAB = \angle DBA = \angle ABC = \angle BAC = 60^\circ$ . (3mks)



(b)(i) Name the quadrilateral ADBC (1mk)

(ii) Construct a circle touching all the sides of the quadrilateral (3mks)

(d) Calculate, correct to one decimal place, the area of the region enclosed by the quadrilateral but outside the circle. (3mks)

22. In a certain shop the cost of 3 spades and 2 hammers is Kshs.1180 and the cost of 2 spades and one hammer is Kshs 680. Find, using matrix method ,the cost of one spade and one hammer. (6mks)

(b)In another shop, the cost of a spade is 15% higher while the cost of a hammer is 10% lower. Find the total cost of 5 spades and 6 hammers in the shop (4mks)

23. The rates of taxation for income earned in a certain year were as follows;

Income Ksh p.m	Tax rate (%)
1- 19200	10
19201-29000	15
29001-38800	20
38801- 48600	25
48601-58400	30
Above 58400	35

Mr Tembo earned a monthly basic salary of Kshs.50,740. He received monthly allowances amounting to 35% of his basic salary and a tax relief of sh .1162.

Calculate;

(a) Mr. Tembo's taxable income (2mks)

(b) Mr. Tembo's gross tax (4mks)

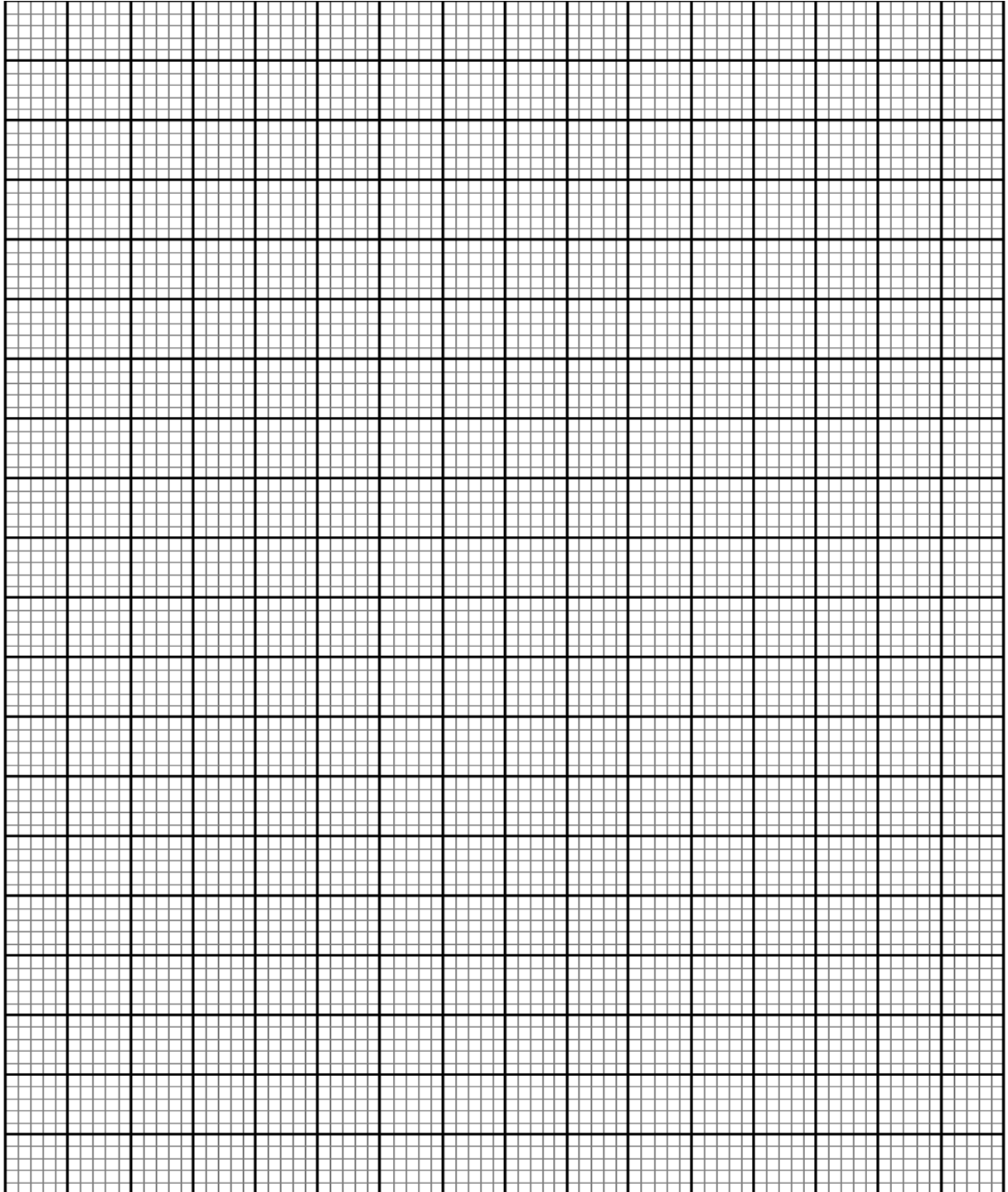
(c) Mr. Tembo's net tax (2mk)

(d) Mr. Tembo's net salary (2mks)

24. (a) Complete the table below using the quadratic function  $y = x^2 + 2x - 2$ . (1mk)

X	-6	-5	-4	-3	-2	-1	0	1	2	3	4
y											

(b) Draw the graph of  $y = x^2 + 2x - x$  on the grid provided below (3mks)



(c) Estimate the area bounded by the curve, x-axis, the lines  $x = 1$  and  $x = 4$  using three equal strips.

i. Using trapezoidal rule (2mks)

ii. Using mid-ordinates rule (2mks)

iii. By integration (2mks)