

FORM 3 ENDTERM 3 EXAM

MATHEMATICS

PAPER 1

NAMEADM.....CLASS.....

121/1

MATHEMATICS

Paper 1

Time: 2½ Hours

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

INSTRUCTIONS TO THE CANDIDATES

- Write **your name** and **index number** in the spaces provided above
- This paper contains two sections; **Section 1** and **Section 11**.
- Answer all the questions in **section 1** and only **five** questions from **Section 11**
- All workings and answers must be written on the question paper in the spaces provided below each question.
- Marks may be given for correct working **even if** the answer is wrong.
- Calculations and KNEC Mathematical tables may be used **EXCEPT** where stated otherwise.
- Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.

FOR EXAMINERS'S USE ONLY

Section 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Marks																	

Section 11

Question	17	18	19	20	21	22	13	24	Total
Marks									

GRAND TOTAL

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This paper consists of 16 printed pages. Candidates should check carefully to ascertain that all the pages are printed as indicated and no questions are missing.

SECTION I (50 MARKS)

Answer all questions in this section in the spaces provided.

1. Without using a calculator ,evaluate

$$\frac{\frac{3}{4} + 1\frac{5}{7} \div \frac{4}{7} \text{ of } 2\frac{1}{3}}{(1\frac{3}{7} - \frac{5}{8}) \times \frac{2}{3}} \text{ Giving your answer as mixed fraction} \quad (3\text{mks})$$

2. Two boys and a girl shared some money. The younger boy got $\frac{5}{18}$ of it; the elder boy got $\frac{7}{12}$ of the remainder and the girl got the rest. Find the percentage share of the younger boy to the girl's share. (4mks)

3. Three numbers, 1400, 1960 and n have a G.C.D and L.C.M of 70 and $2^2 \times 5^2 \times 7^2 \times 11$ respectively. Find the least possible value of n (3mks)

4. A bus starts off from Kitale at 9. a.m and travels towards Kakamega at a speed of 60km/hr. At 9.50 a.m, a matatu leaves Kakamega and travels towards Kitale at a speed of 60Km/h. How far from Kitale will the two vehicles meet? (3mks)

5. Find the equation of a straight line which is equidistant from the points **A**(2,3) and **B** (6,1) (3mks)

6. Simplify the expression completely (3mks)

$$\frac{12x^2 - 16x}{20 - 11x - 3x^2}$$

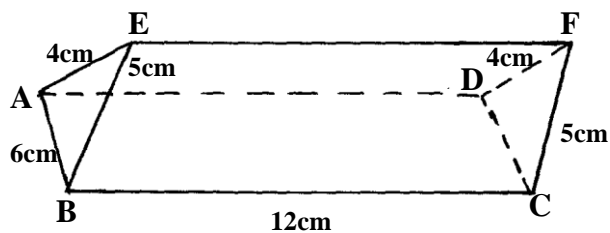
7. Given that $\sin \theta = \frac{2}{3}$ and θ is an acute angle, find without using tables $\tan^2 \theta + \cos^2 \theta$. Give your answer as a mixed fraction. (3mks)

8. Solve for y in the equation below. (4mks)

$$8(2^2)^y = 6(2^y) - 1$$

9. Using a ruler, a pair of compasses only and (proportional) a set square, construct on the upper side division of line BC , a line BD such that $\angle DBC = 37.5^\circ$. Use the line BD to divide BC into 4 equal portions. (3mks)

10. Sketch the net of the solid below. (2mks)



11. In a regular polygon, each interior angle is x° and each exterior angle is $\left(\frac{x-36}{3}\right)^\circ$

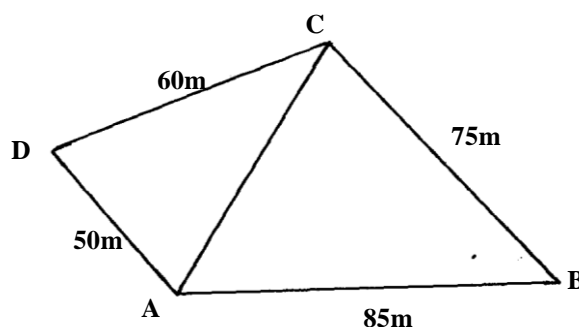
(i) Find angle X°

(1mk)

(ii) Find the number of sides of the polygon

(2mks)

12. The figure below represents a plot of land **ABCD** such that **AB**= 85m, **BC** 75m **CD**= 60m **DA** = 50m and angle **ACB** = 90° . (not drawn to scale)



Determine the area of the plot, in hectares correct to two decimal places.

(4mks)

13. An open rectangular box measures externally 32cm long, 27cm wide and 15cm deep. The box is made up of metal 1cm thick. If it has a mass of 1.5kg, what is the density of the box to 4 significant figures?
(3mks)

14. Find the integral values of x which satisfy the following inequalities;

$$2x + 3 > 5x - 3 > -8$$

(3mks)

15. A Kenyan bank buys and sells foreign currency as shown below.

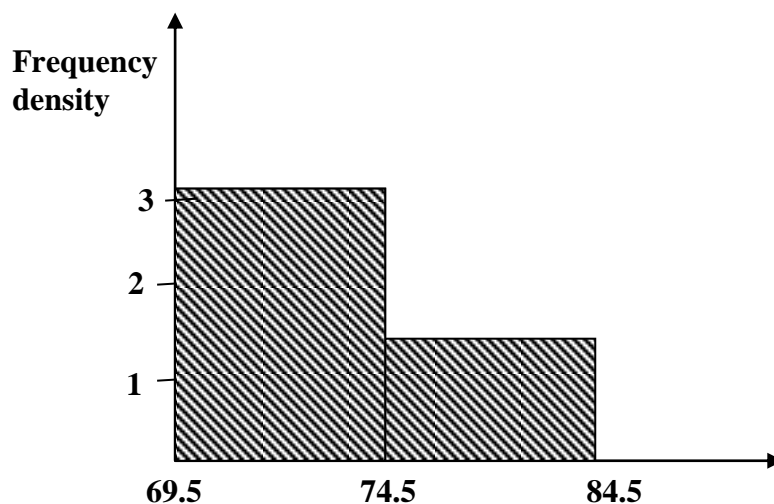
	Buying Ksh	Selling Ksh
1 US dollar (\$)	63.00	63.20
1 UK pound (£)	125.00	125.95

A tourist arrived in Kenya with £ 9600 which he converted into Kshs at a commission of 5%. He later used $\frac{3}{4}$ of the money before changing the balance of dollars at no commission calculate ; to the nearest dollar, the amount he received.

(3mks)

16. The histogram shown below represents the distribution of marks obtained in attest. The bar marked A has a height of 3.2 units while **B** has aheight 1.2 units. If the frequency of the class represented by **B** is 6, find the frequency of the bar represented by **A**.

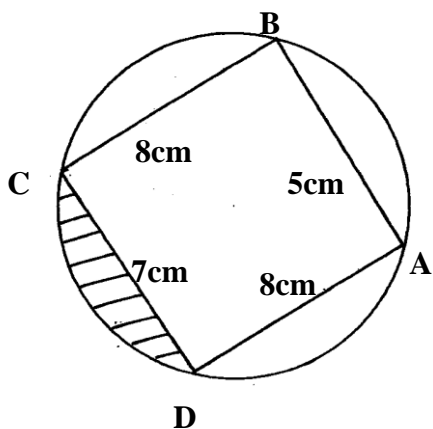
(3mks)



SECTION II (50 MARKS)

Answer any five questions in this sections in the spaces provided.

17. The figure below (not drawn to scale) shows a quadrilateral **ABCD** inscribed in a circle. **AB** = 5cm, **BC** = 8cm, **CD** = 7cm and **AD** = 8cm. **AC** is one of the diagonals of length 10cm.



- (a) Find the size of angle **ABC**.

(3mks)

- (b) Find the radius of the circle.

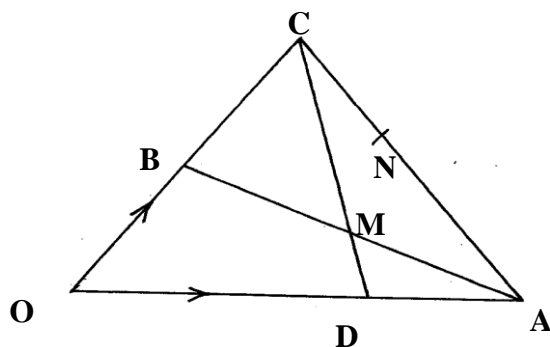
(2mks)

- (c) Hence, calculate the area of the shaded region.

(5mks)

18. In the figure below $\vec{OB} = \underline{\underline{b}}$, $\vec{OC} = 3\vec{OB}$ and $\vec{OA} = \underline{\underline{a}}$

(a) Given that $\vec{OD} = \frac{1}{3} \vec{OA}$ and $\vec{AN} = \frac{1}{2} \vec{AC}$, \vec{CD} and \vec{AB} meet at M . Determine in terms of $\underline{\underline{a}}$ and $\underline{\underline{b}}$



(i) \vec{AB}

(1mk)

(ii) \vec{CD}

(1mk)

(b) Given that $\vec{CM} = k \vec{CD}$ and $\vec{AM} = h \vec{AB}$ determine the values of the scalars k and h (5mks)

(c) Show that O, M and N are collinear.

(3mks)

19. Three variables p , q and r are such that p varies directly as q and inversely as the square of r .

a. When $p = 18$, $q = 24$ and $r = 4$.

Find p when $q = 30$ and $r = 10$. (4mks)

b. Express q in terms of p and r .

(1mk)

c. If p is increased by 20% and r is decreased by 10% find:

i. A simplified expression for the change in q in terms of p and r . (3mks)

ii. The percentage change in q .

(3mks)

20. A circular lawn is surrounded by a path of uniform width of 7m. The area of the path is 21% that of the lawn.

(a) Calculate the radius of the lawn.

(4 marks)

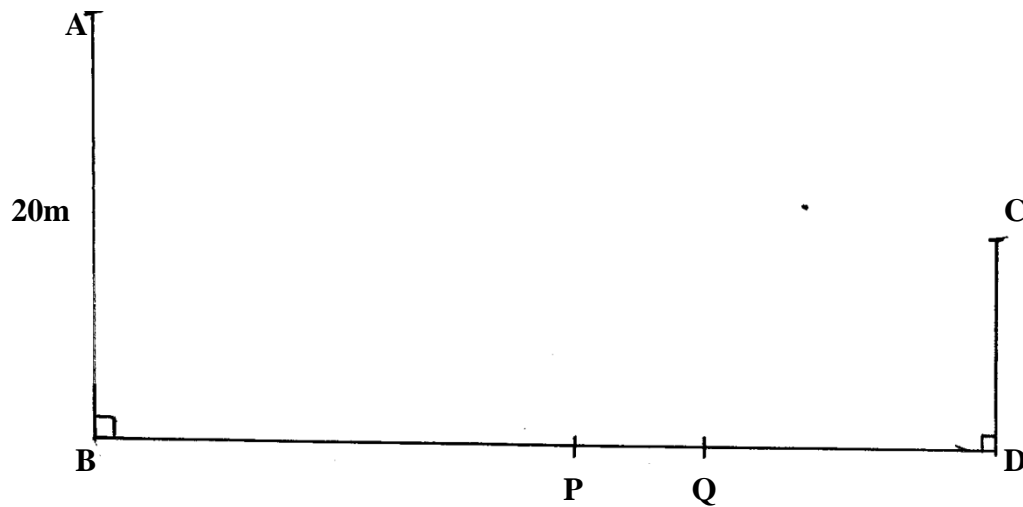
(b) Given further that the path surrounding the lawn is fenced on both sides by barbed wire on posts at intervals of 10 metres and 11 metres on the inner and outer sides respectively. Calculate the total number of posts required for the fence.

(4 marks)

(c) Calculate the total cost of the posts if one post costs sh 105.

(2 marks)

21. The diagram below represents two vertical watch – towers **AB** and **CD** on a level ground. **P** and **Q** are two points on a straight road **BD**. The height of the tower **AB** is 20m and road **BD** is 200m



- (a) A car moves from **B** towards **D**. At point **P**, the angle of depression of the car from points **A** is 11.3° . Calculate the distance **BP** to 4 significant figures. (2mks)
- (b) If the car takes 5 second to move from **P** to **Q** at an average speed of 36km/hr, calculate the angle of depression of **Q** from **A** to 2 decimal places. (3mks)
- (c) Given that **QC** = 50.9 cm, calculate
- (i) The height of **CD** in meters to 2 decimal places; (2mks)
- (ii) The angle of elevation of **A** from **C** to the nearest degree. (3mks)

22. The parents of a certain mixed secondary school decided to buy a school van worth Ksh. 900,000. Each student was to contribute the same amount of money. 50 students were transferred from the school; as a result each of the remaining students had to pay Ksh. 600 more.

(a) Find the original number of the students in the school. (5mks)

(b) Find the percentage change in contributions per student. (3mks)

(c) If the ratio of boys to girls in the school was 11: 7 find the amount of money contributed by boys alone.

(2mks)

23. Five members of 'SILK', a self-supporting enterprise Jane, Jepchoge, Esther, Mama Charo and Chepkoech were given a certain amount of money to share amongst themselves. Jane got $\frac{3}{8}$ of the total amount while Jepchoge got $\frac{2}{5}$ of the remainder. The remaining amount was shared equally among Esther, Mama Charo and Chepkoech each of which received Kshs. 6,000;

a. How much was shared among the five business women? (3mks)

b. How much did Jepchoge get? (2mks)

c. Jane, Jepchoge and Chepkoech invested their money and earned a profit of Kshs. 12,000. A third of the profit was left to maintain the business and the rest was shared according to their investments. Find how much each got. (5mks)

24. Onyango and Juma live 200km apart. One day, Onyango left his house at 7.00am and travelled towards Juma's house at an average speed of 30km/hr. Juma left his house at 7.30am on the same day and travelled towards Onyango's at an average speed of 40km/hr.

(a) Determine:-

i. The time they met. (2mks)

ii. The distance from Onyango's house where the two met. (2mks)

iii. How far was Onyango from Juma's house when they met? (2mks)

(b) The two took 15 minutes at the meeting point and then travelled to Juma's house at an average speed of 20km/hr. Find the time he arrived at Juma's house.(2mks)