

Name.....Index No.:.....

School..... Candidate's Signature

Date:

121/2

**FORM FOUR
MATHEMATICS**

PAPER 2

TIME: 2¹/₂ HOURS

INSTRUCTIONS TO CANDIDATES

- Write your **name** and **index number** in the spaces provided above
- **Sign** and write the **date** of examination in the spaces provided
- This paper consists of **TWO** sections: **Section I** and **Section II**.
- Answer **ALL** the questions in **Section I** and only **Five** from **Section II**.
- All answers and working must be written on the question paper 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.
- Candidates should answer all questions in English
- This paper consists of 12 printed pages.
- Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

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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SECTION I

Answer all questions

1. Using logarithms tables, evaluate. $\sqrt[3]{\frac{36.72x(0.46)^2}{185.4}}$ (4marks)

2. Make M the subject of the following $K = \left(\frac{Mv^2}{X + M} \right)^{1/2}$ (3marks)

3. A quantity R varies partly as X and partly inversely as y. Find the equation connecting R, X and y, when X = 1, y = 2 and R = 4, when X = 3, y = 2 and R = 10. (3marks)

4. Expand $(2+2y)^5$. Hence find the value of $(2.02)^5$, correct to 4 decimal places when substitution for y is upto y^4 . (4marks)

5. Without using calculators or mathematical tables. Express in surd form and simplify. (4marks)

$$\frac{\cos 30}{\sin 45 + \tan 30}$$

(4marks)

6. Solve the given equation for values of $0^\circ \leq x \leq 180^\circ$. (4marks)

$$4\cos^2 x - 3\cos x = 6.$$

7. There are three athletics A, B and C in a 100m race. A is twice as likely to win as B, while B is twice as likely to win as C. find the probability that:-
- (a) A does not win the 100m race. (2marks)
- (b) Either B or C wins the 100m race. (2marks)
8. Rationalize and simplify $\frac{3}{2-3\sqrt{2}} + \frac{5}{2+3\sqrt{2}}$ up to the form $a+b\sqrt{c}$ where a, b, and c are integers (3marks)
9. The sides of a triangle were measured to 1 decimal place as 6.5cm, 7.4cm and 8.2cm respectively. Calculate the percentage error in its perimeter (4marks)
10. Given that $(5m - 2n) : (2m - n) = 7:5$. find the ratio m:n (3marks)

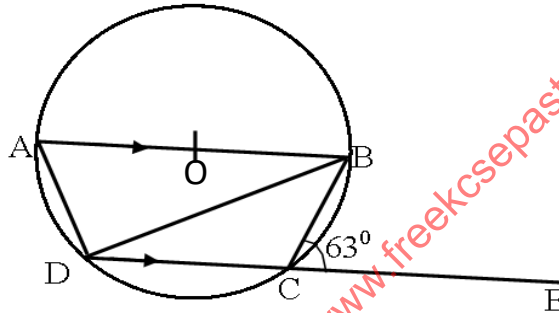
11. A line L_1 is perpendicular to the line $2y + 3x = 6$. Determine the acute angle made by the line L_1 and the x – axis (2marks)

12. A bus and a matatu starts from Nairobi to Kisii via Narok at the same time making a distance of 280km. The matatu averages 20km/h faster than the bus and reaches there 1 hour 36minutes earlier. Determine the speed of the bus. (3marks)

13. Solve for x in $2 \log x + \log 6 = 2 + \log 9$ (2marks)

14. Indian type A of rice costs ksh. 70 per kilogram while Egyptian type B of rice costs ksh 84 per kilogram. A shopkeeper mixes the two types of rice in the ratio 4:3 respectively. At what price must he sell the mixture to make a profit of 26% per kilogram?(2marks)

15. In the figure below the diameter AB of the circle is parallel to DC. DCE is a straight line and angle BCE = 63° . Calculate the angle DBC. (3marks)



16. It is given $2 \leq a \leq 3$, $4 \leq b \leq 5$, $6 \leq c \leq 7$.

Find the smallest and the greatest values of $\frac{c-a}{b}$ (2marks)

SECTION II (50 MARKS)

Answer any FIVE questions in this section.

17. A carpenter makes two types of chairs for Keroka Secondary School. To make type A chair it requires 6 man – hours where as a type B requires 4 man – hours. The cost of material for type A is sh 120 and that for type B is sh100. The profit on type A is sh 80 and profit on type B is sh 60. The carpenter has to abide by the following conditions

- (i) A contract to supply 15 of type A and 10 of type B per week has to be fulfilled
- (ii) Only 300 man – hours are available in each week.
- (iii) Total weekly cost of material for all chairs should not exceed sh 6000

If type A and type B chairs were x and y per week respectively.

- a) Write down the inequalities satisfying these conditions (4marks)

- b) Represent this information on a grid and show the region by shading out the unwanted.

(4marks)

- c) What values of x and y will give maximum profit. Determine this maximum profit. (2marks)

18. Mr. John is a civil servant. He earns a basic monthly salary of ksh. 24 345, a house allowance of Ksh12,000 and medical allowance of ksh 2790, he is entitled to a personal relief of Ksh 1162 p.m, he has also an insurance scheme for which he pays premiums of Ksh 2300, he is entitled to a relief on the premiums at 15% of the premium paid. He is also a member of a cooperative society where he pays ksh 3000 towards his shares p.m. Use the taxation table below to calculate his net salary per month, take to whole number.

(10marks)

Income (K£P.a)	Rate.(%)
1 -5808	10
5809 – 11280	15
11281 – 16752	20
16753 – 22224	25
Above 22224	30

19. Four schools A, B, C and D are such that B is 94Km due North of A and C is on a bearing of 295 from A at a distance of 60km D is on a bearing of 310⁰ from C and a distance of 42km. using a scale of 2cm to 20km, make an accurate scale drawing to show the relative positions of the schools. (4marks)

Find:

(i) The distance and the bearing of B from C (2marks)

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

(iii) The bearing of A from D (2marks)

20. An aircraft leaves town P (30°S , 17°E) and moves directly northwards to Q(60°N , 17°E). It then moved at an average speed of 300 knots for 8 hours westwards to town R. Determine;

a) The distance PQ in nautical miles. (3marks)

b) The position of town R. (3marks)

c) The local time at R if local time at Q is 3.12 p.m (2marks)

d) The total distance moved from P to R in kilometers. Take 1 nautical; = 1.853 kilometres. (2marks)

21. Construct triangle FGH with $FG = 7\text{cm}$, $FH = 6.5\text{ cm}$ and $GH = 5.2\text{cm}$

(i) Construct the circum circle of triangle FGH and measure its radius. (6marks)

(ii) In the same triangle FGH, the point Y moves such that it is at least 4.7cm from F and closer to GH than to GF. It lies within the confines of the triangle FGH. Indicate clearly the region in which Y must lie. (4marks)

22. The table below shows the scores of Mathematics of a particular class in a certain school.

Marks	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	4	6	7	5	x	9	3	5	2	7

By taking an assumed mean to be 45.5 marks, the value of actual mean is 49.5 marks.

(a) Determine the value of x (3marks)

(b) Calculate the standard deviation (4marks)

(c) If 30 students passed the test. Calculate the pass mark (3marks)

23. A figure whose co-ordinates are A(-2, -2), B(-4, -1), C(-4, -3) and D (-2, -3) undergoes

successive transformations ERS; where E, R and S are transformations represented by the matrices,

$$E = \begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}, \begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix} \text{ and } R = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

On the grid provided, show the figure ABCD and its image under the successive transformations ERS. (6marks)

a) Find the matrix representing the single transformation mapping the image found in (a) above back the object figure ABCD. (2marks)

- b) Triangle PQR has vertices at P(2, 2), Q(4, 1) and R(6, 4). On the same grid, show the image of triangle PQR under a shear with line $y = 2$ invariant and point R(6, 4) is mapped onto R'(2, 4). (2marks)

24. The table below shows the corresponding values of X and Y which are connected by a relation of the form $y = ab^x - 10$, where a and b are constants.

X	1	2	3	4	5
Y	-6.5	4.1	47.5	197.5	947.5

Draw a suitable line graph and find the appropriate numerical values of a and b. Use the grid below. (10marks)