

Name.....Index No.:.....
 School.....Candidate's Signature
 Date:

121/1
 FORM FOUR
 MATHEMATICS
 Paper 1
 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

SECTION I (50 MARKS)

Answer all the questions in this section in the spaces provided.

1. Evaluate (3marks)

$$\frac{28+18}{-2} - \frac{-15-(12)}{3}$$

2. Each interior angle of a regular polygon is 100° larger than the exterior angle. Determine the number of sides of the polygon. (3marks)

3. Simplify $\frac{125^{2/5}}{243^{-3/5}} \div 3^4$ (3marks)

4. Find the percentage error in the perimeter of a regular polygon whose side is 15.0cm. (3marks)

5. Kamau bought five exercise books and three geometrical sets for sh.725. If he had bought four similar exercise books and five geometrical sets, he would have paid sh.375 more. How much would he pay for two exercise books and six geometrical sets.
- (3marks)

6. Find the integral values that satisfy the inequalities

$$4x - 6 \geq x - 12$$

$$8 - 3x \geq 2x - 7$$

Represent it on the number line.

(3marks)

7. Find the least number of biscuits that can be packed into carton boxes which contain either 9 or 15 or 20 or 24 with none left over.
- (3marks)

8. Evaluate without using mathematical tables or calculators, the square root of

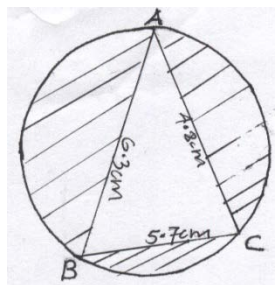
$$\frac{0.0273 \times 1.152}{1.3 \times 1.68}$$

(4marks)

9. A cold water tap can fill a bath in 10 minutes while a hot water tap can fill it in 8 minutes. The drainage pipe can empty it in 5 minutes. The cold water and hot water taps are left running for 4 minutes. After which all the three taps are left running. Find how long it takes to fill the bath. (3marks)

10. The hire purchase term of a cupboard is a deposit of Ksh. 4,400 and six monthly instalments of ksh. 900 each. The hire purchase price is 175% of the cost price while the cash price is 25% more than the cost price. What is the cash price of the cupboard? (3mk)

11. The circle below whose area is 18.05 cm^2 circumscribes a triangle ABC where $AB = 6.3 \text{ cm}$, $BC = 5.7$ and $AC = 4.8 \text{ cm}$. Find the area of the shaded part. (3marks)



12. A teacher gave his form four class a quiz in mathematics which was marked out of 50 marks. The distribution of the marks was as shown in the table below.

Mark	10-14	15-19	20-24	25-29	30-34	35-39	40-44
Frequency	2	4	6	10	9	7	2

Calculate the median of this class.

(2marks)

13. Determine the quartile deviation for the following set of numbers.

7,5,10,6,5,8,7,3,2,7,8,9

(3marks)

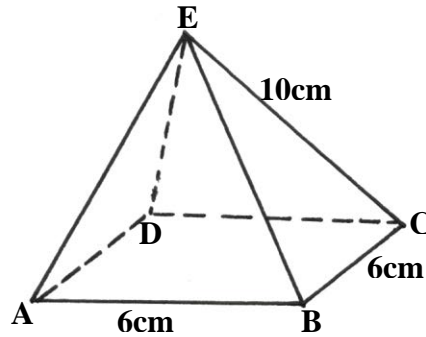
14. Two bags A and B contain similar balls. Bag A contains three red and two black balls. Bag B contains four red and three black balls. A ball is picked from each bag. Find the probability that the balls are of the same colour.

(3marks)

15. Solve for x $\log(x+2) = 1 + \log(4x-3)$

(4marks)

16. Draw the net of the solid below and calculate the surface area of solids. (4marks)



SECTION II (50 MARKS)

Answer any FIVE questions in this section

17. Income tax for all the income earned was charged at the rates shown:

Total income p.a(K£)	Rate in Sh. Per K£
1 - 1980	2
1981 - 3960	3
3961 - 6440	5
6441 - 7920	7
7921 - 9900	9
Excess of 9900	10

- a) Wanyonyi earned a salary of Sh. 10,500 per month. In addition he was given a house allowance of Sh. 6500 per month. He got family relief of Sh. 300 per month. Find
- (i) His taxable income P.a (2marks)

(ii) Income tax he pays per month. (6marks)

b) Apart from income tax, the following deductions are made per month. NHIF of Sh. 320. Widow and pension scheme of 2% of his gross salary. Calculate his net monthly pay. (2marks)

18. The table below shows the marks obtained by form four students in a mathematics examination.

Marks	20-25	26-31	32-37	38-43	44-49	50-55	56-61	62-67	68-73
Students	2	6	12	20	26	15	10	7	2

(a) State the modal class. (1mark)

(b) (i) Find the mean. (5marks)

(ii) Find the standard deviation.

(4marks)

19. (a) Given that $y = 7 + 3x - x^2$, complete the table below.

X	-3	-2	-1	0	1	2	3	4	5	6
Y	-11			7						-11

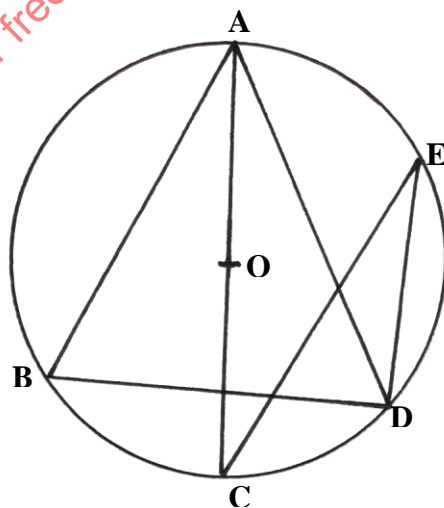
(2marks)

(b) On the grid provided and using a suitable scale, draw the graph of $y = 7 + 3x - x^2$ (3marks)

c) On the same grid draw the straight line and use your graph to solve the equation. $x^2 - 4x - 3 = 0$ (3marks)

d) Determine the coordinates of the turning point of the curve. (2 marks)

20. In the figure below O is the centre of the circle.



Angle $BAC=40^\circ$, angle $CBD=50^\circ$ and angle $ACD=60^\circ$. Giving reasons determine:

(a) angle CED (2marks)

(b) angle BDC (2marks)

(c) angle CAD (2marks)

(d) angle ADB (2marks)

(e) angle ABD (2marks)

21. (a) Use graphical method to solve the equations $x + 2y = 5$ and $3x - 2y = 7$ (7marks)

(b) Verify your solutions by using matrix method. (3marks)

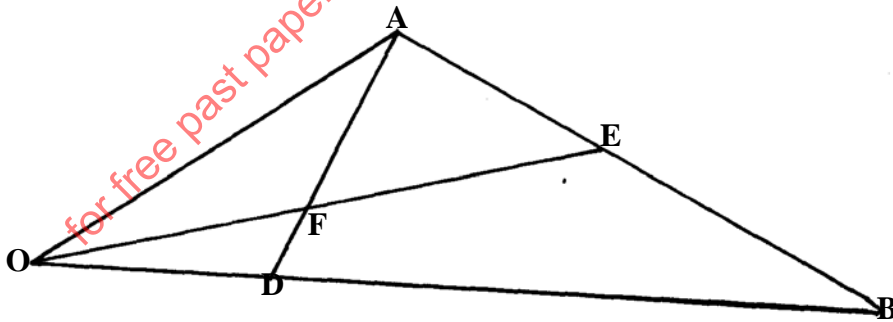
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22. Triangle XYZ whose vertices are (3, -2), (-2,-3) and (1, -3) respectively is mapped on X_1 (5, -1), Y_1 (0, -2) Z_1 (3, -2) by transformation T_1 . XYZ is mapped on to X_2 (-3,2), Y_2 (2,3), Z_2 (-1,3) by transformation T_2 . XYZ is mapped on to X_3 (-6, 4), Y_3 (4, 6), Z_3 (-2,6) by transformation T_3 .

a) Plot XYZ and its three images (4marks)

b) Describe fully each of the transformations T_1 , T_2 and T_3 . (6 marks)

23. In the figure below **E** is the midpoint of **AB**, **OD = DB = 2:3** and F is the point of intersection of **OE** and **AD**.



(a) Given that $\mathbf{OA} = \mathbf{a}$ and $\mathbf{OB} = \mathbf{b}$, express in terms of \mathbf{a} and \mathbf{b} :

(i) \mathbf{OE} (1mark)

(ii) \mathbf{AD} (2marks)

(b) Given further that $\mathbf{AF} = t$, \mathbf{AD} and $\mathbf{OF} = s\mathbf{OE}$, find the values of s and t . (5marks)

(c) Hence show that \mathbf{O} , \mathbf{F} and \mathbf{E} are collinear. (2marks)

24. Two ships leave a harbor \mathbf{K} at the same time. One ship takes a course of 030° over a distance of 60km to a position \mathbf{P} . The other ship sails 100km on a bearing of 110° to position \mathbf{Q} .

(a) Calculate:

(i) Distance \mathbf{PQ} . (3marks)

(ii) Angle \mathbf{PQ} . (3marks)

(iii) The bearing of Q from P.

(2marks)

(b) Both ships take t hours to reach their destinations. The speed of the faster ship is 20km/hr.

Find:

(i) The value of t

(1mark)

(ii) the speed of the slower ship.

(1mark)

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