NAME ………………………………….…… **ADM NO**……….… **DATE** ……..………

SIGNATURE …………...……….

MATHEMATICS

FORM 3

MARCH/APRIL 2024

TIME: 2 ½ HOURS

END OF TERM ONE EXAMINATION

Kenya Certificate of Secondary Education 2024

INSTRUCTIONS TO CANDIDATES

1. *Write your name and admission number in the spaces provided at the top of this page.*
2. *This paper consists of two sections:* **Section I and Section II.**
3. *Answer **all** questions in **section I** and ONLY five questions in Section **II.***
4. *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
5. *Marks may be given for correct working even if the answer is wrong.*
6. ***KNEC** Mathematical tables may be used.*

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

17	18	19	20	21	22	23	24

Grand Total

SECTION I (50 marks)
Answer all the questions in the spaces provided in this section

1. Evaluate; (3 marks)

$$\frac{\left(\frac{2}{3} - 1\frac{1}{4} + \frac{5}{6}\right)}{\frac{2}{3} \; of \; 2\frac{1}{4} - 1\frac{1}{7}}$$

2. (a) Without using mathematical tables and calculators simplify;

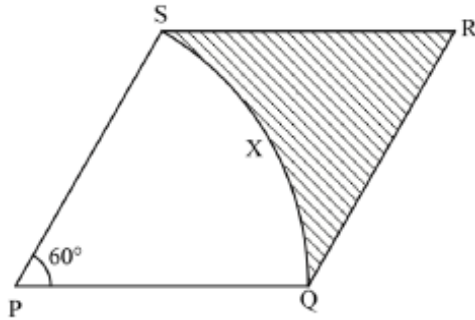$$(3 - \sqrt{7})(3 + \sqrt{7}).$$ (1 mark)

   (b) Hence evaluate; (2 marks)

$$\frac{2}{3 - \sqrt{7}} - \frac{2}{3 + \sqrt{7}}$$

3. Given that $2^x \times 3^y = 108$. Solve the value of x and y (3 marks)

4. The figure below shows a rhombus PQRS with PQ = 9 cm, and $\angle SPQ = 60°$. SXQ is a circular arc, centre P.

Calculate the area of the shaded region correct to 2 decimal places. (Take $\pi = \frac{22}{7}$)

(3 marks)

5. A tourist arrived in Kenya with sterling pound (£) 4680 all of which he exchanged into Kenyan money. He spent Ksh. 51,790.40 while in Kenya and converted the rest of the money into U.S dollars. The exchange rates were as follows.

	Buying (Ksh)	Selling (Ksh)
US dollar ($)	147.16	147.36
Sterling pound (£)	182.13	182.43

a) Convert (£) 4680 into Kenya shilling (2 marks)

b) Calculate the amount he received to the nearest U.S dollars (2 marks)

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6. Kamau leaves home for school at 10:00 a.m. He walked for 30 minutes, then took a rest for two hours. He then boarded a matatu for 4 hours. At what time did he arrive in school? (2 marks)

7. A refrigerator can be bought in cash for Ksh. 35,000. The same refrigerator can be purchased on hire purchase terms by first paying a deposit of Ksh 6,000 followed by 24 equal monthly instalments of Ksh. 1,500. Calculate the hire purchase price and the carrying charge. (3 marks)

8. Given that; $3 - 2x < x - 3 \leq 4$
   a) Form two inequalities (2 marks)

   b) Solve for the value of x (1 mark)

   c) State all the integral values satisfying the inequalities. (1 mark)

9. Line L1 passes through the point $A(2, 6)$ and $B(4, 8)$. Find the equation of L2 which is a perpendicular bisector of line L1. (3 marks)

10. The sum of interior angles of two regular polygons of sides; n and n + 2 are in the ratio 3:4. Calculate the sum of the interior angles of the polygon with n sides. (3 marks)

11. Solve the following equation. (3 marks)
$$1 + \log_5 x = \log_5 12$$

12. Find the volume of the cone whose slant height is 15 cm and a height of 9 cm. (3 marks)

13. Convert the recurring decimal $12.\dot{1}\dot{8}$ into fraction (3 marks)

14. The angle of elevation of the top of a tower from a point X on the horizontal is $28.5°$. From another point Y, 8 meters near to the base of the tower, the angle of elevation of the top of the tower is $37.2°$. Calculate, to one decimal place, the length of the tower. (3 marks)

15. The radius of a cylinder is 4.2 cm and the height is exactly 12 cm. Find the percentage error in calculating its volume. (3 marks)

16. Solve for the values of x given that; (4 marks)
$$2 - 3x = 3x^2 - 4x - 5$$

Answer any five questions in this section

17. In the figure below is a cyclic quadrilateral ABCD

a) Calculate the following angles marked in small letters   (4 marks)

     i.   Angle **a**

    ii.   Angle **b**

   iii.   Angle **c**

   iv.   Angle **e**

b) find the value of x and y in the figure below   (2 marks)

c) In the figure below O is the center of the circle. Calculate the value of x (2 marks)

18. From the diagram below, solve the following
    i.   Find angle CAB
    ii. Find angle ABC
    iii. Find the area of the shaded region

19. (a) On the rid provided below, draw the quadrilateral ABCD whose vertices are at
A (2, 0), B (1, 3), C (5, −1) and D (1, −2)   (1 mark)
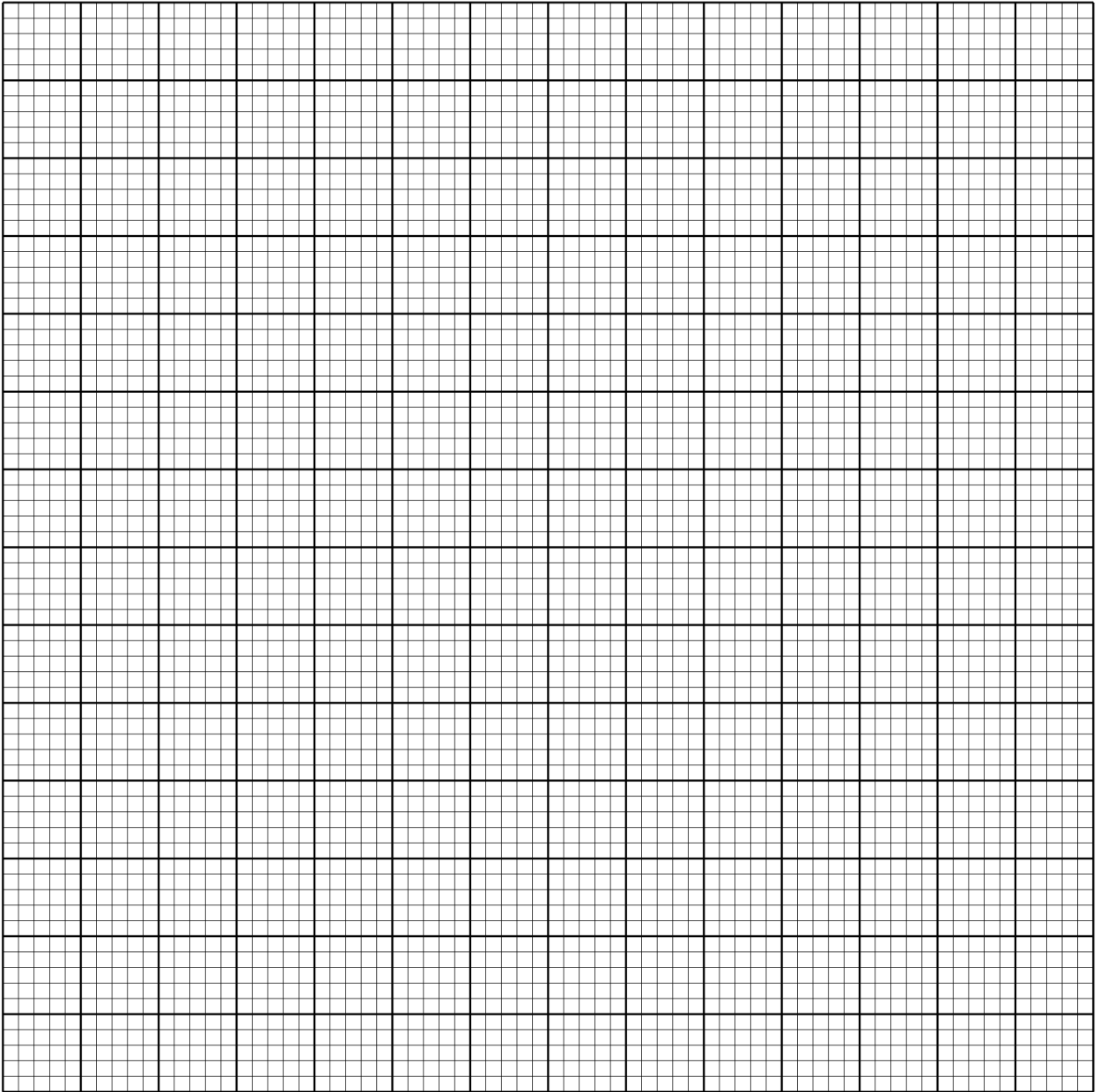
(b) On the same axes, draw $A'B'C'D'$ the image of ABCD under a translation represented
by the vector $\vec{T} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ (2 marks)

(c) Draw the quadrilateral $A''B''C''D''$ the image of $A'B'C'D'$ under a reflection in the line
$y + x = 0$ on the same axes. State the coordinates of $A''B''C''D''$.   (3 marks)

(d) $A'''B'''C'''D'''$ with vertices at $A'''(−2.5)$, $B'''(4, 3)$, $C'''(2, 11)$ and $D'''(−6, 3)$ is
the image of $A''B''C''D''$ under transformation X. Draw $A'''B'''C'''D'''$ and describe X
fully.   (3 marks)

(e) State the type of congruency between quadrilaterals ABCD and $A''B''C''D''$. (1 mark)

20. The diagram represents a solid frustum with base radius 21cm and top radius 14cm. The frustum is 22.5cm high and is made of a metal whose density is $3\ g/cm^3$. (Take $\pi = \frac{22}{7}$)
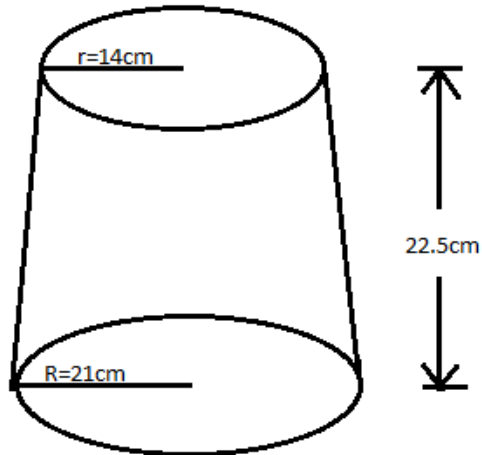
a) Calculate;
   i.   The height of the small cone that was cut from the big cone   (1 mark)

   ii. The volume of the big cone   (1 mark)

   iii. The volume of the cone   (1 mark)

   iv. The volume of the frustum   (2 marks)

b) The mass of the frustum in kg.   (2 marks)

c) The frustum is melted down and recast into a solid cube. In the process 20% of the metal is lost. Calculate to 2 decimal places the length of each side of the cube.

                                                                                    (3 marks)

21. Four towns A, B, C and D are such that B is on a bearing of 247° and 6 km from A .C is due south east and 4.8 km from B. D is to the south of A and bearing of C from D is S44°W.

a) Make a scale drawing showing the relative positions of ABC and D. (Use scale of 1 cm rep 1 km)

b) Use your drawing to determine
   i. The bearing of A from C.

   ii. Distance between C and D.

   iii. how far D is east of B

22. (a) A saleslady earns a commission of 3% and 5% for sale of goods up to Kshs. 100,000 and above Kshs. 100,000 respectively. In a certain month. Sarah's total commission was Kshs. 15,100. Calculate the value of goods that Sarah sold that month.   (3 marks)

(b) Nerry paid Kshs. 955,000 for a car at Sammy Traders. This was a discount of 4.5%. Sammy Traders made a profit of 16% from this sale. What is the amount of profit that Sammy Traders realized from this sale? Give your answer to the nearest Kshs. 100.

(4 marks)

(c) Jane bought a cow at Sh 35 000. She sold the cow at Sh 52 000. After one week, she bought the same cow at Sh 55 000 and sold it again at Sh 58 000. How much profit did she make at the end of the business?   (3 marks)

23. The following are masses of 25 students in form 4 class.

49, 51, 50, 60, 55, 45, 56, 51, 58, 59, 44, 42, 59, 50, 62, 46, 43, 57, 56, 52, 43, 41, 40, 54, 44

a) Draw a frequency distribution table with the lower class 40 --- 43   (2 marks)

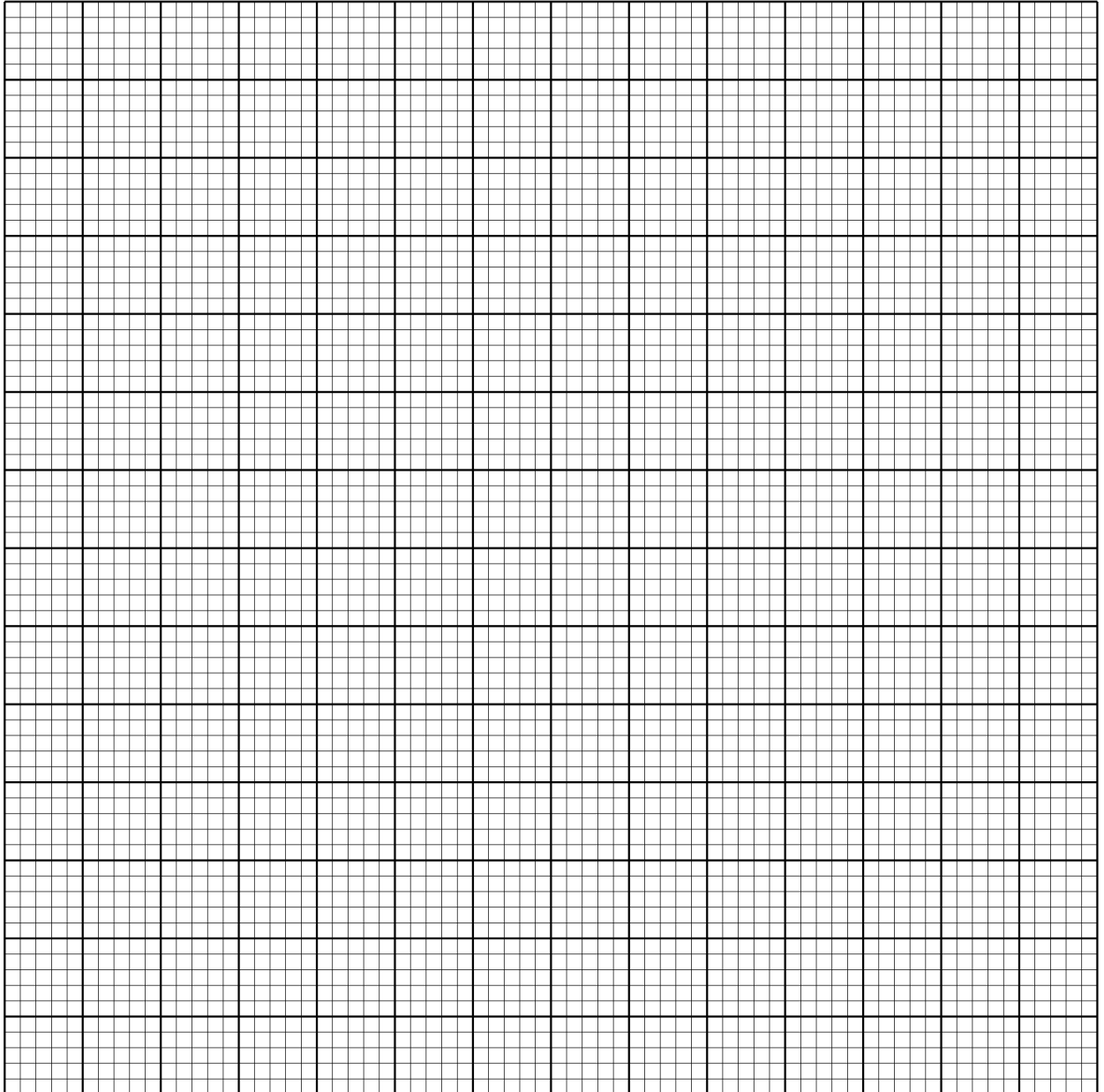b) Estimate the mean mass   (3 marks)

c) **Estimate** the median mass   (3 marks)

d) State the modal frequency and modal class   (2 marks)

24. (a) Complete the table below for the equation of $y = x^2 + 3x - 6$ $for -6 \leq x \leq 4$

x	-6	-5	-4	-3	-2	-1	0	1	2	3	4
y	12			-6			-6				22

(b) Using a scale of 1 cm to represent 2 units in both axes draw the graph of $y = x^2 + 3x - 6$

(c) Use the graph to solve

   i. $x^2 + 3x - 6 = 0$

  ii. $x^2 + 3x - 2 = 0$

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