

NAME ADM NO..... DATE
SCHOOL..... SIGNATURE

121

MATHEMATICS

FORM 2

OCTOBER 2024

TIME: 2 ½ HOURS

END OF TERM THREE 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 **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

**Grand
Total**

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SECTION I (50 Marks)

1. Use tables of logarithms to evaluate; (3 marks)

$$\sqrt[3]{\frac{(0.07432)^2 \times 48.38}{8458}}$$

2. The length, width and height of cuboid of mass 40g, are 10 cm, 5 cm and h cm respectively. If it has a density of $0.02g/cm^3$, calculate the height of the Cuboid. (3 marks)

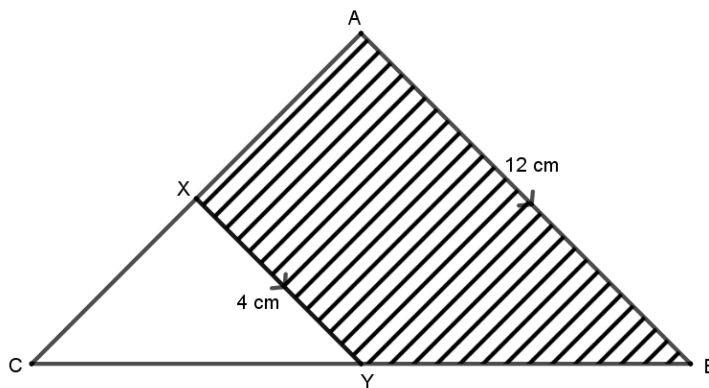
3. A man walks directly from point Q towards the foot of a vertical flag post 200 m away, after covering a distance of 140m , he observes the angle of elevation of the top of the flag post is 75° . Calculate to 2 decimal places
- a) The height of the flag post (2 marks)

- b) The angle of elevation from point Q to the top of the flag post (2 marks)

4. Without using mathematical tables or calculator evaluate (3 marks)
- $$\frac{27.72 \times 0.3876}{2.09 \times 0.4284}$$

5. Evaluate $\sqrt[3]{27x^3y^9}$ (2 marks)

6. In the figure below lines AB and XY are parallel $AB = 12 \text{ cm}$ and $XY = 4 \text{ cm}$



If the area of the shaded region is 36 cm^2 . Find the area of the triangle CXY (3 marks)

7. Given that $\cos \theta = \frac{8}{10}$, without using mathematical tables express in fraction form the value of

a) $\sin \theta$ (2 marks)

b) $\tan (90 - \theta)$ (1 mark)

8. Given that $\tilde{P} = 5\check{a} - 2\check{b}$ where $\check{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\check{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$. Find:

a) Column vector $\mathbf{P}$.

(2 marks)

b) P' the image of P under a translation vector $\begin{pmatrix} -6 \\ 4 \end{pmatrix}$.

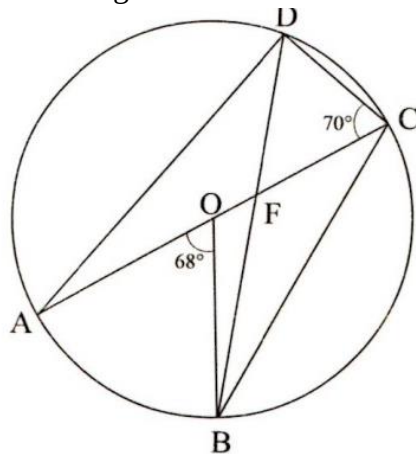
(1 mark)

9. Simplify

$$\frac{3x^2 - 4xy + y^2}{9x^2 - y^2}$$

(3marks)

10. The figure below shows a circle centre O and AOC as its diameter. Chords BD and AC intersect at F . Given that angle $AOB = 68^\circ$ and angle $ACD = 70^\circ$



.Find the size of

a) Angle DAC

(1 mark)

b) Angle **BFC**

(2 marks)

11. Find the value of x in the equation $81^x \times \frac{1}{3} \times 9^{2x} + 74 = 317$

(3 marks)

12. Find the surface area of a cone whose diameter is 12cm and height 8cm

(3 marks)

13. Three automatic electric bells A, B and C ring at intervals of 20 minutes, 30 minutes and 50 minutes respectively. If the bells ring together at 8.20 a.m, at what time will they ring simultaneously again for the first time.

(3 marks)

14. The equation of a line is $-\frac{3}{5}x + 3y = 6$

Find the:

a) Gradient of the line.

(1 mark)

- b) Equation of a line passing through point $(1, 2)$ and perpendicular to the given line. (2 marks)

15. The area of a rhombus is 60cm^2 . If the shorter diagonal is 8cm, Find the perimeter of the rhombus (4 marks)

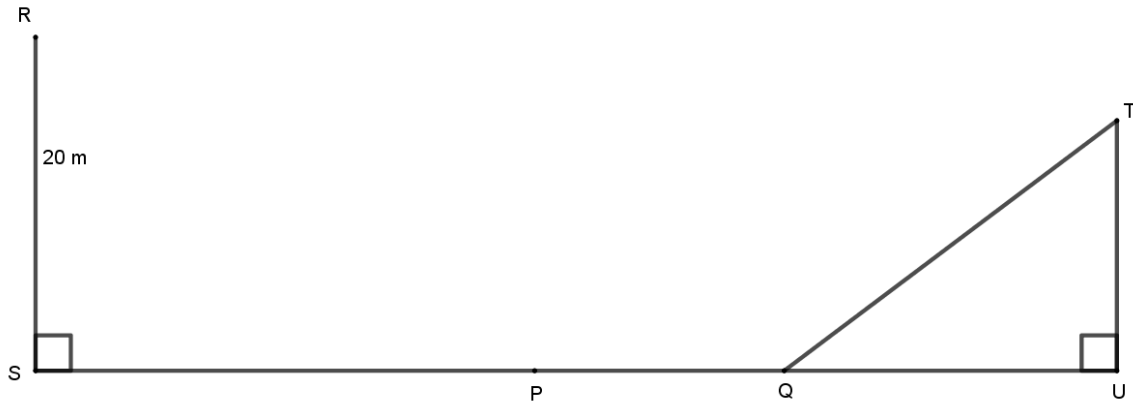
16. State all the integral values of x that satisfy the following inequality. (3 marks)

$$2x - 3 \leq 3x + 5 \leq 7x + 6$$

SECTION II (50 marks)

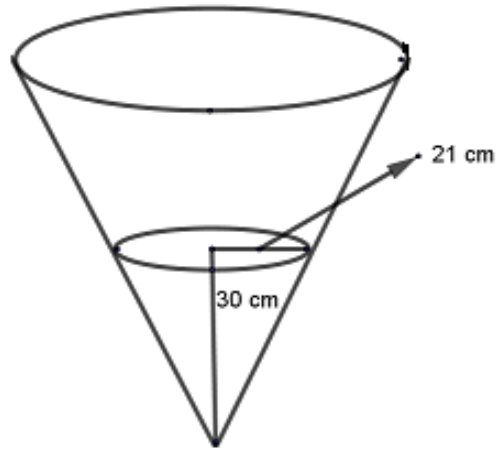
Attempt ALL questions in the spaces provided in this section

17. The diagram below represents two vertical watch towers RS and TU on a level ground. P and Q are two points on a straight road SU. The height of the tower RS is 20 m and road SU is 200m.



- a) A bus moves from S towards U. At point P, the angle of depression of the bus from point R is 11.3° . Calculate the distance SP to 4 significant figures. (2 marks)
- b) If the bus takes 5 seconds to move from P to Q at an average speed of 36 km/h, calculate the angle of depression of Q from R to 1 decimal place. (3 marks)
- c) Given that $QT = 50.9$ m, calculate;
- i. The height of TU in metres to 1 decimal place. (2 marks)
- ii. The angle of elevation of R from T to the nearest degree. (3 marks)

18. The diagram below represents a conical vessel which stands vertically .The vessel contains water to a depth of 30cm .The radius of the surface with water in the vessel is 21cm .(Take $\pi = \frac{22}{7}$)



- a) Calculate the volume of the water in the vessel in cm^3 (3 marks)
- b) When a metal sphere is completely submerged in the water ,the level of water in the vessel rises by 6cm.Calculate
- The radius of the new water surface in the vessel (2 marks)
 - The volume of the metal sphere in cm^3 (3 marks)
 - The radius of the sphere (2 marks)

19. Using a pair of compasses and ruler only;

a) Construct triangle ABC such that $AB = 8\text{cm}$, $BC = 6\text{cm}$ and angle $ABC = 30^\circ$. (3 marks)

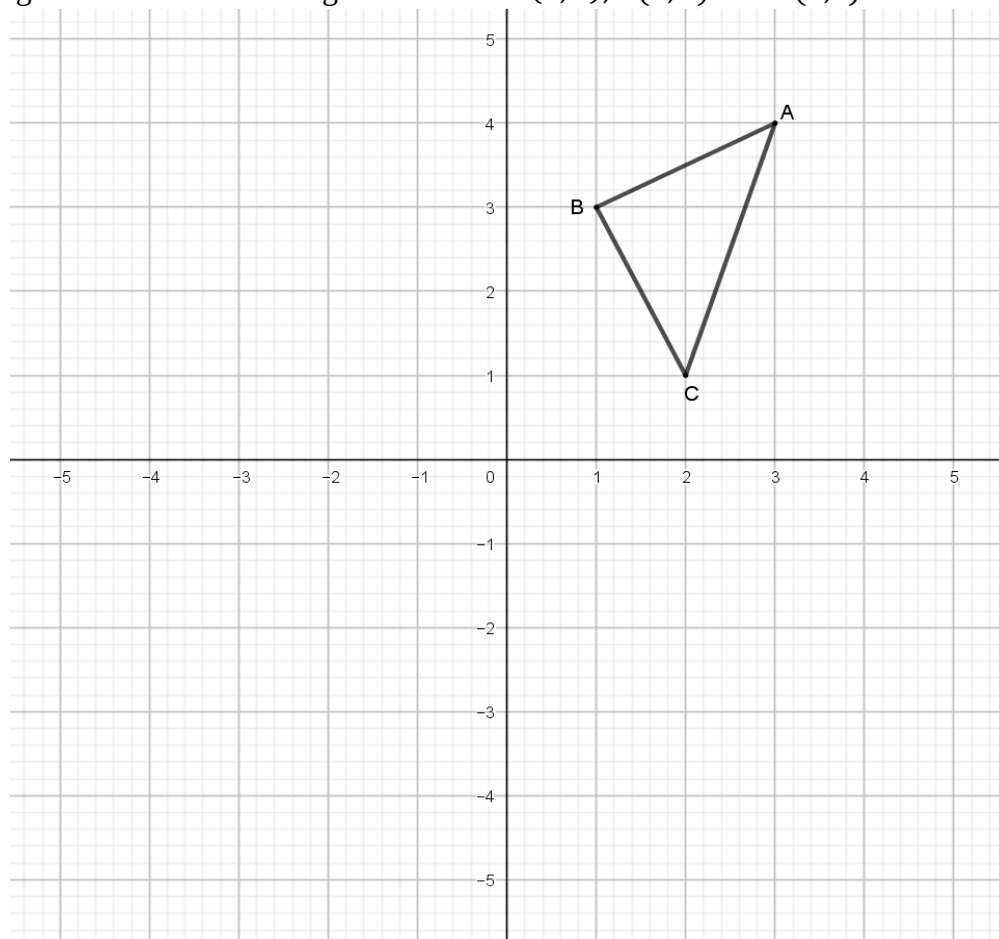
b) Measure the length of AC (1 mark)

c) Draw a circle that touches the vertices A,B and C. (2 marks)

d) Measure the radius of the circle (1 mark)

e) Hence or otherwise, calculate the area of the circle outside the triangle. (3 marks)

20. The diagram below shows triangle ABC with $A(3, 4)$, $B(1, 3)$ and $C(2, 1)$.



- Draw $\Delta A'B'C'$ the image of ΔABC under a rotation of $+90^\circ$ about $(0, 0)$. (2 marks)
- Draw $\Delta A''B''C''$ the image of $\Delta A'B'C'$ under a reflection in the line $y - x = 0$. (2 marks)
- Draw $\Delta A'''B'''C'''$ the image of $\Delta A''B''C''$ under a rotation of -90° about $(0, 0)$ (2 marks)
- State the coordinates of triangles $\Delta A''B''C''$ and $\Delta A'''B'''C'''$. (2 marks)
- Write down the equation of the lines of symmetry of the quadrilateral $A'''A'$. (2 marks)

21. The mass in kilograms of 30 patients who attended a clinic on a certain day were recorded as follows:

38	52	46	60	39	62	73	49	54	49
41	57	58	79	62	58	54	65	56	69
72	58	42	41	67	49	51	54	59	60

a) Starting with a class width of **35 – 39** ...make a frequency distribution table for the data indicating the class and frequency (3 marks)

b) State the modal class (1 mark)

c) Calculate the median mark (3 marks)

d) Calculate the median mark (3 marks)