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Mathematics
Paper 1
July /August 2023
2 ½ hours

KAYUNGA SECONDARY SCHOOLS EXAMINATIONS COMMITTEE (KASSEC)
JOINT MOCK 2023
Uganda Certificate of Education

MATHEMATICS

Paper 1

2 HOURS: 30 MINUTES

INSTRUCTIONS TO CANDIDATES:

- *Answer all the questions in section **A** and any **FIVE** from section **B**.*
- *Any additional question(s) answered will **NOT** be marked.*
- *All necessary calculations must be shown clearly with the rest of the answer. Therefore, no paper should be given for rough work.*
- *Graph paper is provided.*
- *Silent, non – programmable scientific calculators and mathematical tables with a list of formulae may be used.*

Turn Over

SECTION A (40 MARKS)

1. The operation a ^ b = $10b^2 - 3a^2$, evaluation -1 ^ (2 ^ 1). **(4marks)**

2. The coordinates of points **A** and **B** are (-4, -5) and (m, n) respectively. The coordinate of the midpoint of **AB** are (-3, 1). Determine the values of m and n. **(4marks)**

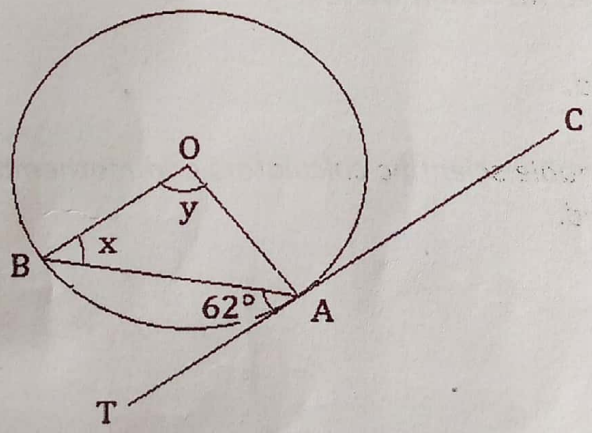
3. Kamala's salary was increased in the ratio 5 : 3 . if his new salary is shs 600000, find his original salary. **(4marks)**

4. A square ABCD where A(2,0) B(6,0) C(6,4) and D(2,4) under goes a translation given by $\begin{pmatrix} -2 \\ -1 \end{pmatrix}$ followed by another translation $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$. Find **A', B' C'** and **D'** the final image points of **ABCD**. **(4marks)**

5. The length of a rectangle is thrice its width. If its area is 48cm^2, find the perimeter of the rectangle. **(4marks)**

6. Find the image of B (1,-2) after a reflection in the line x =4. **(4marks)**

7. Find the values of x and y for circle below



(4marks)

8. Solve for n in the equation: $243_n = 201_{seven}$. **(4marks)**

9. Given that sinα=0.712 for $0^0 \leq \alpha \leq 180^0$.Find the two possible values of α **(4marks)**

10. Given that $A = \begin{pmatrix} 1 & 2 \\ -1 & 4 \end{pmatrix}$. Find matrix B such that $B = A^2 + 5A + 6I$, where I is a $2x2$ identity matrix. **(4marks)**

SECTION B (60 MARKS)

11. A plan flew due west from air strip **A**, at a speed of 80kmh^{-1} for $\frac{3}{4}$ hours before reaching airstrip B. it then altered its course and flew northwest to airstrip C at 220kmh^{-1}. From there it flew on a bearing of 060^0 to airstrip D at 240kmh^{-1} for $1\frac{1}{2}$ hours. The total time of flight between all the four airstrips was $4\frac{1}{2}$ hours.

(a) By scale drawing, determine the distance and bearing of **A** and **D**. (use a scale of 1cm to 50km).

(b) Determine the total distance of flight from **A** to **D** and hence the average speed for the whole journey.

(c) If the plane flew directly back to airstrip A at a speed of 200kmh^{-1}, determine how long it took to fly back to A. **(12marks)**

12. (a) Given that matrix M= $\begin{pmatrix} X^2+1 & 4 \\ X & 3 \end{pmatrix}$ and $|M|=7$, Find the values of x. **(6marks)**

(b) Given that $\begin{pmatrix} 5 & n \\ m & 1 \end{pmatrix}\begin{pmatrix} 2 \\ m \end{pmatrix} = \begin{pmatrix} 16 \\ 18 \end{pmatrix}$. Find the values of m and n. **(6marks)**

13. The table below represents the heights taken to the nearest centimeter of 40 orange trees in a garden.

Heights (cm)	131-140	141-150	151-160	161-170	171-180	181-190	191-200
Frequency	3	4	7	11	9	5	1

(a) Calculate:

(i) the mean height using a working mean of 165.5.

(ii) the median mark

(b) Draw a histogram and use it to estimate the modal height. **(12marks)**

14. Using a ruler, a pair of compasses and a pencil,

(a) Construct a triangle **PQR** with angles **RPQ**= 60^0, **PQR**=45^o and **PQ**=8.4cm. Measure the length **PR** and **QR**.

(b) Construct a line **ST** 12.6cm long bisecting and perpendicular to **QR** and meeting **PR** at **T**. Determine the size of the angle **STQ**.

(c) Join **S** to **R** and **T**. Draw a circle circumscribing the triangle **PRS**. From your diagram determine the radius of the circle. **(12marks)**

15. (a) Draw the graph of the curve $y=5+3x-2x^2$ for $-3 \leq x \leq 4$ using a scale of 1cm : 1 unit on x-axis and 2cm:5units on y-axis.

(b) Use your graph to solve the equation $5 + 3x - 2x^2 = 0$ and find the turning point of the curve.

(c) Use the same graph to solve $2 + 3x - 2x^2 = 0$ **(12marks)**

16. To start a new business, Mr Katongole needs at least 5 buses and 6 lorries. He does not want to have more than 30 vehicles altogether.

A bus takes 3 units of garage space and lorry takes up 1 unit of garage space and there are 54 units of garage space available. If x and y are the number of buses and Lorries respectively.

(a) Write down 4 inequalities to represent the restrictions on Mr Katongole.

(b) Draw a graph which shows a region representing possible values of **x** and **y**.

(c) Running costs for a new business are 15 million a day for a bus and 8 million for a lorry Write down the expression for the total costs per day. **(12 marks)**

17. (a) Kamya wants to measure the height of the building. He measures the angle of elevation of its top and finds it to be 45^0. He then moves a distance of 8cm towards it and measures the angle of elevation of its top and finds it to be 50^0. Kamya is 1.7m tall. Calculate the height of the building.

(b) Given that $\cos\theta=\frac{20}{29}$ and θ is a reflex angle, find the value of $2\sin\theta+\tan\theta$.

(c) If $\tan x=\frac{3}{4}$ for $0^0 \leq x \leq 90$. Evaluate $\frac{cosx-sinx}{cosx+sinx}$. **(12marks)**

END