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MATHEMATICS

Paper 1

May./Jun. 2023

2½ hours



WAKISO-KAMPALA TEACHERS' ASSOCIATION (WAKATA)

WAKATA PRE-MOCK SET 1 EXAMINATIONS 2023

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30minutes



INSTRUCTIONS TO CANDIDATES:

Answer **all** questions in section **A** and any **five** questions from section **B**.

Any additional question(s) answered will **not** be marked.

All necessary calculations must be done in the answer booklet provided; therefore, no paper should be given for rough work.

Squared paper is provided.

Silent, non – programmable scientific calculators and mathematical tables with a list of formulae may be used.

Neat work is a must!!

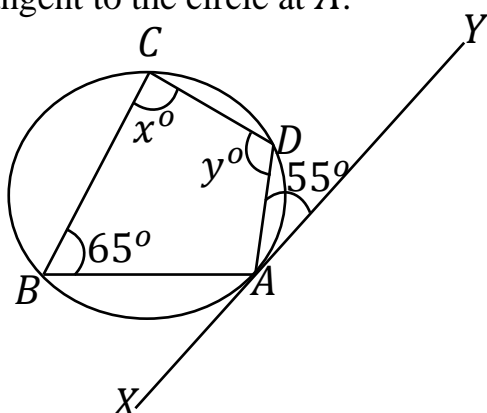
SECTION A: (40 MARKS)

Answer **all** questions in this section.

1. Factorize $x^4 + x^2y^2 + y^4$ completely. (04 marks)
2. Solve $x + 1 < 9x + 9$ and show the solution on a number line. (04 marks)
3. Given matrix $A = \begin{pmatrix} 6 & -2 \\ -4 & 1 \end{pmatrix}$ and I is the 2×2 identity matrix, show that $A^{-1} = \frac{1}{2}(A - 7I)$. (04 marks)
4. A pharmacy sells face masks in a variety of sizes. Their sales over a week are recorded in the table below.

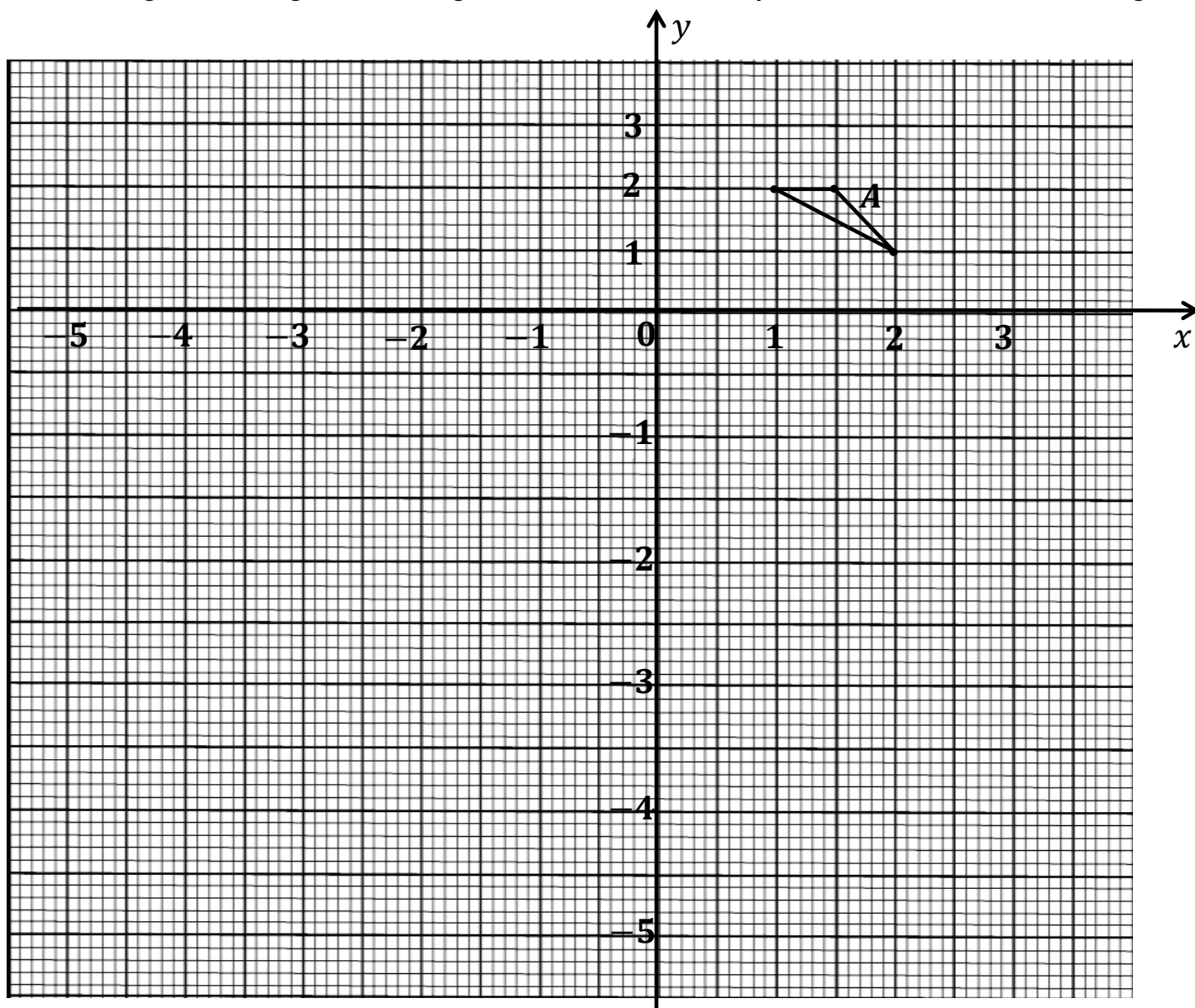
	Kids		Adults			
Size	Small	Large	S	M	L	XL
Frequency, f	29	4	8	24	15	4

- (a) Write down the mode for this data. (01 mark)
 - (b) Given that the shop is open everyday of the week, calculate the mean number of masks sold per day. (03 marks)
5. Express x in terms of p , q and y in the expression $2y = \frac{p}{q + \frac{1}{x}}$. (04 marks)
6. Given that $x * y = 1 - xy + x^2 - y$. Find the value of $(3 * 2) * -1$. (04 marks)
7. In the diagram below, A , B , C and D are points on the circumference of the circle. The line XY is a tangent to the circle at A .



Find the values of x and y . (04 marks)

8. Triangle A undergoes an enlargement transformation by scale factor -2 about the origin.



Plot triangle B , the image of A after the enlargement and state the coordinates of the image triangle. (04 marks)

.....
(Name and Personal Number)



Cut

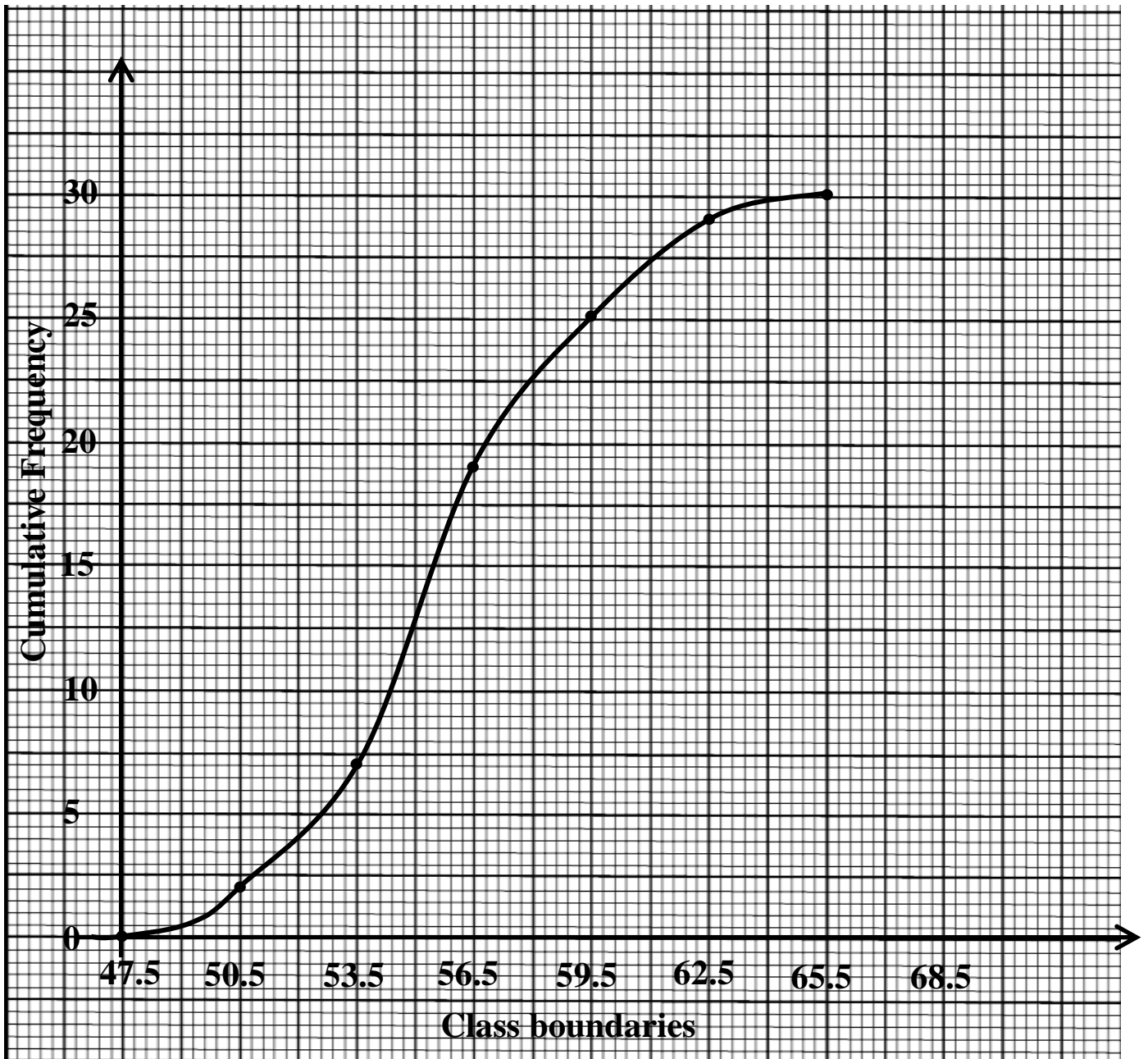
NB: Cut along this line and attach to your answer booklet.
Remember to write your Name and Personal Number on this sheet.

9. 16 cards numbered $\{1, 2, 3, \dots, 16\}$ are put in a box and mixed thoroughly. One person draws a card from the box. Find the probability that the number on the card is divisible by 3 and 2. (04 marks)
10. If $\tan\theta = \frac{-3}{4}$ and θ is reflex, find the value of $\sin\theta$ (04 marks)

SECTION B: (60 MARKS)

Answer any **five** questions from this section. All questions carry equal marks.

11. The cumulative frequency diagram below shows mock results in mathematics examination of Kadama Islamic Secondary School.



Use the graph above to:

- (a) Estimate the median mark. (02 marks)
- (b) Calculate the average mark. (10 marks)

12. (a) Simplify as far as possible. (04 marks)

$$\frac{3x^2y - 27y^3}{3xy - 9y^2}$$

- (b) A garden measuring 15 metres by 20 metres is to have a pedestrian path way installed all around it, increasing the area to $336m^2$.

(i) Given that the width of the path way is x cm; show that $2x^2 + 35x = 18$.

(ii) Find the possible value of x . (08 marks)

13. (a) Given that the matrix $B = \begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix}$. Evaluate $B^2 - 2B$. (05 marks)

- (b) In a supermarket shs. 8,000 can buy 3 apples and 2 mangoes; sh. 13,000 can buy 4 apples and 5 mangoes.

(i) Represent this information in matrix form.

(ii) Find the price of an apple and a mango.

(07 marks)

14. (a) Copy and complete the table below.

θ	0°	90°	180°	270°	360°	450°	540°	630°	720°
$y = \sin\theta$	0			-1		1			
$y = \cos\theta$	1			0		0			

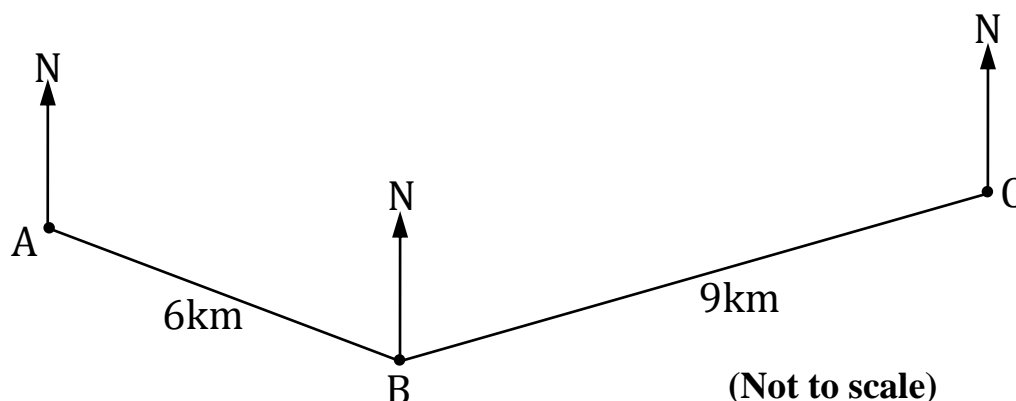
(03 marks)

- (b) Use your completed table to draw the graphs of $y = \sin\theta$ and $y = \cos\theta$ on the same axes. Use a scale of 4cm to represent 1 unit and 2cm to represent 90° . (07 marks)

- (c) Use your graph to solve the equation $\sin\theta - \cos\theta = 0$ for $0^\circ \leq \theta \leq 360^\circ$.

(02 marks)

15. A ship sails 6km from A to B on a bearing of 121° . It then sails 9km to C. The size of angle ABC is 114° .



- (a) Copy the diagram into your answer booklet and show all the information on it. (Accurate construction is **NOT** required) (02 marks)

(b) What is the bearing of C from B? (03 marks)

(c) Find the distance AC to the nearest kilometre. (03 marks)

(d) What is the bearing of A from C? (04 marks)

Give your answer correct to the nearest degree.

- 16.** (a) On a squared paper, plot the points $A(2, -1)$, $B(0, -3)$, $C(2, -4)$ and $D(4, -2)$ and join them to form a quadrilateral $ABCD$. What is the name of this quadrilateral? (03 marks)
- (b) The points $A'(1, 2)$, $B'(3, 0)$, $C'(4, 2)$ and $D'(2, 4)$ are the images of $ABCD$ under a certain transformation T_1 . On the same axes draw quadrilateral $A'B'C'D'$ and describe transformation T_1 fully. (03 marks)
- (c) The points $A''(-2, -4)$, $B''(-6, 0)$, $C''(-8, -4)$ and $D''(-4, -8)$ are the images of $A'B'C'D'$ under a transformation T_2 . On the same axes draw quadrilateral $A''B''C''D''$ and describe transformation T_2 fully. (03 marks)
- (d) On the same axes, draw quadrilateral $A'''B'''C'''D'''$, the image of $A''B''C''D''$ under a reflection in the line $y = 0$. State the coordinates of $A'''B'''C'''D'''$. (03 marks)
- 17.** Aunt Kaduuka sells two types of fresh juice in 250ml cups, Red juice and Yellow juice. Red juice is made from one slice of watermelon, 3 apples and one orange. Yellow juice is made from 3 oranges, 2 apples and a slice of ginger. Aunt Kaduuka has 48 oranges, 42 apples, 10 slices of watermelon and 15 slices of ginger.
- (a) If x denotes the number of cups of Red juice she makes and y denotes the number of cups of Yellow juice she makes, write down **six** inequalities representing the above information. (05 marks)
- (b) Represent the inequalities on a graph paper by shading the unwanted regions. (Use a scale of 2 cm to represent 5 units on both axes) (04 marks)
- (c) If a cup of Red juice costs sh.1000 and that of Yellow juice costs sh.1200, estimate the maximum profit that can be made by Aunt Kaduuka. (03 marks)

END

