YOU EITHER DO IT OR YOU DO IT 2023

- 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 $A^{-1} = \frac{1}{2}(A 7I). \tag{04 marks}$
- A pharmacy sells face masks in a variety of sizes. Their sales over a week are recorded in the table below.

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

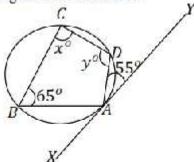
(a) Write down the mode for this data.

(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

$$2y = \frac{p}{q + \frac{1}{2}} \tag{04 marks}$$

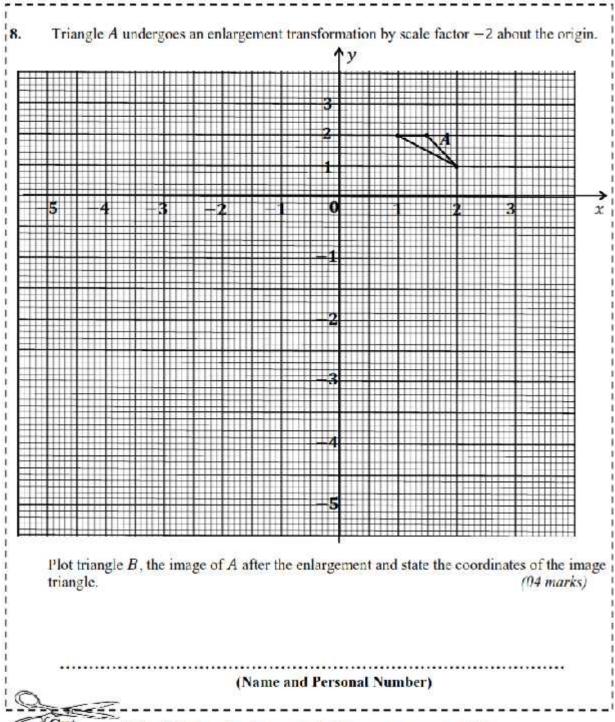
- 6. Given that $x * y = 1 xy + x^2 y$. Find the value of (3 * 2) * -1.
- In the diagram below, A, B, C and D are points on the circumference of the circle.
 The line XY is a tangent to the circle at Λ.



Find the values of x and y.

(04 marks)

1



NB: Cut along this line and attach to your answer booklet.

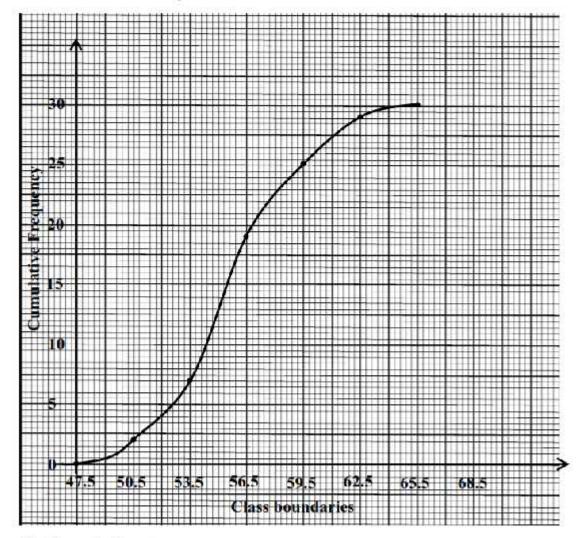
Remember to write your Name and Personal Number on this sheet.

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.

 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)

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

- A garden measuring 15 metres by 20 metres is to have a pedestrian path way installed (b) all around it, increasing the area to $336m^2$.
 - Given that the width of the path way is xcm; show that $2x^2 + 35x = 18$. (i)
 - Find the possible value of x.

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

- In a supermarket shs. 8,000 can buy 3 apples and 2 mangoes; sh. 13,000 can buy 4 (b) apples and 5 mangoes.
 - Represent this information in matrix form. (i)
 - Find the price of an apple and a mango.

(07 marks)

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

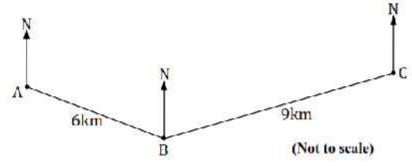
θ	00	900	180°	270°	360°	450°	540°	630°	720°
$y = \sin\theta$	0			-1		1			
$y = cos\theta$	1			0		0			

(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 $0^o \le \theta \le 360^o$.

(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. (02 marks) (Accurate construction is NOT required)
- (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? Give your answer correct to the nearest degree. (04 marks)

- 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 ABC and D 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 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)