RESOURCEFUL O'LEVEL SEMINAR HELD ON SATURDAY 14TH JUNE 2025 AT UGANDA MARTYRS HIGH SCHOOL -LUBAGA

EXAMINATION FORMAT 456/1:

Section A will comprise of two items and section B comprises of Part I and Part II each having two questions and a learner answers one question from part

Item	Elements of construct	Topics covered
SECTION A: compulsory		
Item one	Numbers	Number bases
		Working with integers
		Fractions, percentages and decimals
		Numerical concept 1 and 2
		Ratios and proportions
Item Two	Patterns and algebra	Sequences and patterns
		Algebra 1 and 2
		Mapping and relations
		Inequalities and regions
		Equation of a straight line
		Rectangular Cartesian plane
		Simultaneous equations
		Linear programming
		Loci
		FUNCTIONS
SECTION B		
PART I (choose one question)		
Item 3 and 4	DATA AND PROBABILITY	Data collection, display and presentation
		Graphs
		Set theory
		Matrices
		Probability
PART II (choose one question)		
Items 5 and 6	GEOMETRY AND MEASURES	Geometrical construction
		Bearings
		General and angle properties of geometric figures
		Reflection
		Business arithmetic
		Time and tables
		Similarities and enlargement
		Circle
		Rotation
		Length and area properties of two dimensional geometrical figures
		Nets, areas and volumes of solids
		Trigonometry 1 and 2
		Vectors
		Business mathematics
		Matrix transformation
		Circle properties
		Lines and planes in three dimensions

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THEME 1: NUMBERS

ITEM1

Three brothers decided to start a school, Kato contributed one hundred and five million shillings ,Kakuru contributed 225million shillings while Kiiza contributed 1/3 of what Kakuru had contributed ,they were advised to spend 60% of their total contributions on building the school structures ,0.3 of the money on school furniture and fittings and save the rest for salaries and miscellaneous expenses for the first term ,so as their business manager they requested you to deposit the money on the account using the ATM machine that was near but the PIN had been saved as 110221 in quaternary base but has to be converted to decimal base .

They also agreed to share their profits in the ratio of their contributions at the end of each year. In the first year of operation, they made a profit of 81,000,000 shillings but Kiiza was not sure of what he was supposed to get so he asked for your help.

TASK.

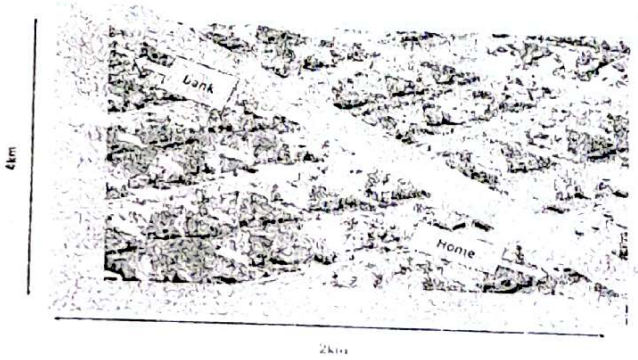
(a) Show the brothers how much money you are to deposit on the account and how you generated the actual PIN.
(b) How much of the profits was supposed to go to Kiiza.

ITEM2

Mr Katende is a pensioner who rarely goes to the bank. He sent his grandson to withdraw one million six hundred eighty thousand shilling using the ATM. $\frac{2}{3}$ of the money was to cater for Mr Katende's home needs. And **0.6** of the remaining money was for the grand son's school fees.

Due to security reasons, he gave the grandson a paper with a number **241**$_{five}$ which represented a four-digit code for the ATM in **base four**.

He gave his son the map showing the direction to the bank. The son wanted to know the distance of the direct route but failed to do so.



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Task

a. How much many was paid as school fees for the grand son?

b. What is the ATM code that the grandson used to withdraw the money

c. Help the grand son to find the distance from home to the bank using the shortest route?

THEME 2: PATTERNS AND ALGEBRA

ITEM 3

Objective function / optimal func

Susan has opened up a drug shop and needs to buy some drugs P and Q to stock her shop, at one wholesale pharmacy in town she was told that a tin of P and 3boxes of Q would cost shs 45,000 while one tin of P and a box of Q would cost shs 20,000, she needs to determine the cost of each tin of P and each box of Q so that she can set her price at the drug shop.

She also wants to sell her plot that she bought in the neighboring village in order to buy one in the village where her drug shop is however she is not sure of the exact dimensions but she knows that it is rectangular in nature with its length being **20m** more than the width with an area **6300m²**. She has asked for help to determine the exact dimensions of the plot so as to set its price.

Task

a) Determine the cost of one tin of P and one box of Q.
b) Help Susan to determine the dimensions of her plot

ITEM 4

A manufacturer makes two types of toys A and B , Three machines (I,II and III) are needed for this purpose and the time (in minutes) required for each toy on the machines is given below

Types of toys	machines		
	I	II	III
A	12	18	6
B	6	0	9

Each machine is available for a maximum of 6hrs per day .

The profit on each toy of type A is shs 750 and that of each type B is shs 500, the manager needs to determine the number of each type of toy to be produced so as to make maximum profit.

Task

(a) Write mathematical relationships to represent the production conditions shown.
(b) By showing the feasible region determine the possible number of each type of toy that can be made in order to maximize profit and the maximum profit that can be made.

Let the no of Toys of A be x | 6x60 minutes

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THEME 4 : DATA AND PROBABILITY

ITEM 5

At a given hardware shop, the manager requested the owner to increase on the number of casual workers who help to load cement for clients since the customers had now increased. The owner requested the manager to present the record of the sales so as to determine the mean sales per day. The record of the number of bags of cement sold that day to 40 clients was as below.

49	40	45	36	67	32	45	42
40	42	61	48	45	67	51	53
35	46	50	43	47	37	47	47
49	30	62	48	53	41	53	43
45	49	51	44	48	38	49	48

The owner needs this information presented a graphically to make a decision. If 75% of the clients bought more than 51 bags of cement, a new worker will be brought to the shop.

Task

a) Represent the information on a frequency distribution table with the first class being 30 - 34 to help determine the mean.

b) (i) Represent the above information on a statistical graph which can be used to determine if a new worker is to be brought to the hardware shop.

(ii) will the new worker be brought to the hardware shop? Give a reason

ITEM 6

In order to improve on food security in a certain village, 130 farmers decided to grow crops which included Maize, Beans, Cassava and others. 62 famers decided to grow Beans, 83 farmers to grow Maize and 60 farmers for Cassava.

30 farmers were to grow both beans and Maize, 40 were to grow both Maize and Cassava while 20 farmers were to grow both beans and cassava. 18 farmers decided to grow only Maize and some famers were to grow other crops other than food crops. It is known by the farmers that if 50% of them do not grow more than one of the above food crops. some members in the village will no get food. A certain organization wishes to reward **one** of the farmers who have grown all the three types of crops, and to get to this farmer, they have decided to play a game. In the game; They have put 4 red marbles and 7 green marbles in a box.

A farmer is to pick two marbles at random, one after the other without replacement from this box.

If one picks marbles of different colors, he/she **wins.** The farmers would like to know their chances of winning but have found it difficult.

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Task

a) Use the above information to determine if all families in the village will get food.
b) What is the chance that a farmer who plays the game will win?

Item7.

With the aim of fighting the problem of unemployment of the youth in Uganda, the government has set up factories in different regions in the country where the youth can be employed. One of the factories in Namanve industrial park produces Tables, Chairs and stools. There three departments of woodwork, painting and packaging which handles the production of furniture in this factory.

It takes the woodwork department 4 hours to produce a table,3 hours to produce a chair and 2hours to produce a stool. The painting department takes 2 hours to paint a table ,1 hour to paint a chair and 2 hours to paint a stool The packaging department takes 1 hour to park a table,1 hour to park a chair and 1 hour to park a stool.

The factory has received an order to produce 10 tables, 20 chairs and 15 stools but the client needs to know how long it would take them to deliver the finished products and the factory managers asked the woodwork department for a response.

TASK.

Using the knowledge of mathematics, help the woodwork department manager to determine the total number of hours required by the three departments to produce the order.

Item .8

The aspiring member of parliament for Luuka district wishes to give bursaries to students who will excel in different co-curricular activities at your school if the probability of a student performing in at least two activities exceeds 0.5.

It was discovered that of the 180 students at your school 20 had not participated in any cocurricular activity of Music ,Drama and Sports.90 students participated in music,80 students participated in Drama and 70 students participated in Sports, 40 participated in both music and Drama,30 participated in both Drama and Sports. The number of students who participated in Music and Sports only was five more than those who participated in all the three activities.

TASK .

Basing on the calculations from the information given, Do you think the Aspiring candidate will give bursaries to the students in your school.

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THEME 4 : GEOMETRY AND MEASURES

ITEM 9

An events organizing company needs to make a new type of decoration, they want to cut out an octagon out of the circular cardboard whose diameter is 8cm so you are given the task to come up with the accurately cut out decoration.

The head decorator has got a contract to organize an event but he does not have enough money for materials he needs so he wants to borrow shs 8200,000, the bank has two options but, option 1 ,they can give him the loan at a compound interest rate of 15% per annum to be paid in 20 option 2 the loan can be given at an interest rate of 5.5% per month, the bank requires that for both options the money should be paid back in 20 equal installments. He plans to pay back the money in 2 years so he needs your help to decide which option to use.

Task

(a) You are required to show how you were able to draw the accurate octagon as instructed.
(b) Using your mathematical skills recommend a loan option for the head decorator to use .

ITEM 10

National Drug Authority manager is to deliver drugs from their store to three hospitals. The car he is going to use has 15 litres of fuel and it uses 1 litre of fuel for every 15km. He left the store to the first hospital which is 60km away in a direction of $N70^0E$. He then moved southwards at an average speed of $100kmhr^{-1}$ for 30 minutes to the second hospital. From there, he took a bearing of 200^0 and moved a distance of 40km to the third hospital.

At the third hospital he was shown a direct route that would take him to the store but he was not sure whether the remaining fuel in the car was enough for that journey since he didn't know how long that route was.

Task:

Help the manager to determine;

(a) The distance of the direct route from the third hospital to the store.
(b) Whether the remaining fuel in the car will be enough for the journey using the direct route.

ITEM 11

Your school is organizing a 50 years celebration run. They plan to draw a map to be given to the participants. They have chosen the school as the starting point and from here, they are to take the road which is in the direction $E30^0S$ for 5km to a check point. From this check point, they will move in the direction 235^0 and run a distance of 9km to junction C which will be the finishing point. From here, the runners will then just walk back to school using a direct route from the junction to school.

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The school is to hire a vehicle for filming the event. This vehicle consumes 1 liter of fuel per 2km and 1liter costs sh 5000. The hiring cost for the vehicle is sh 400,000 and the school is to fuel the vehicle.

Task

a) Make a sketch map that will be given to the participants
b) What is the distance that the participants will just walk?
c) How much will the school spend on the vehicle?

ITEM 12

Your school is to buy stools to be used in the science laboratory. The stools are to be with a round wooden top. It has been decided that the top should be of radius 0.2m. At his workshop, the carpenter who has been contracted to make the stools has pieces of timber which he had cut into triangular shapes. These pieces have two sides which are 30cm and 35cm and they intersect at an angle of 600. The carpenter needs to find out whether he can cut these pieces of timber to make the tops of the stools required by the school.

Task

a) (i) By geometric construction, advise the carpenter whether the required size of the stool top can be made from the available triangular pieces of timber.
(ii) Give a reason for your answer above.

END

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