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MATHEMATICS

Paper 1

2024

2 ¼ hours



**BUSOGA REGION JOINT EXAMINATION BOARD**  
**Uganda Certificate of Education**

MATHEMATICS

Paper 1

2 hours 15 minutes

**INSTRUCTIONS TO CANDIDATES**

*This paper consists of **two** sections; **A** and **B**. it has **six** examination items*

*Section **A** has **two** compulsory items*

*Section **B** has **two** parts; **I** and **II**. Answer one item from each part*

*Answer **four** examination items in all*

*Any additional item(s) answered will **not** be scored*

***All** answers **must** be written in the answer booklet(s) provided*

*Graph paper is provided*

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

## SECTION A

Answer *all* items in this section

### Item one

You are the **CEO** of a certain construction company that has been contracted to construct a bridge in a swamp. The map of the area covered by the swamp has a scale reading 1: 250,000. On this map, the swamp of the area is  $7.36\text{cm}^2$ . According to the work plan, you will use either a bull dozer vehicle if the actual area of the swamp is less than  $40\text{km}^2$  or an excavator vehicle if the actual area of the swamp is greater than  $40\text{km}^2$ . If you are to use a bull dozer, 25 operators will be needed each being paid ugx 65,000 per day and if you are to use an excavator, 14 operators will be needed each being paid ugx 125,000 per day. The company has been given fifty million shillings to do the work in only two weeks.

After paying the operators' expenses, the balance is to be used in: 40% as your pay, 18% to go to maintenance and repair of the vehicles and the remaining amount to the director

### Task

- (a) (i) Calculate the actual area of the swamp in  $\text{km}^2$
- (ii) Which type of vehicle are you going to use?
- (b) How much money will be paid to the operators for the duration you will construct the bridge?
- (c) What's the difference between your payment and director's payment?

### Item two

Joram is a businessman who deals in purchase and sales of mattresses. He is constructing a ware house where he is to store the mattresses. The floor of the ware house has its width shorter than its length by 20m and the whole floor occupies an area of  $800\text{m}^2$ . According to the plan, the ware house has a ceiling whose height from the floor is a quarter the length of the floor.

Joram is going to use this ware house to store two types of mattresses he is to purchase; type A and type B. He is going to purchase at most 200 mattresses of type A and less than 100mattresses of type B. Each mattress of type A occupies a volume of  $20m^3$  and each mattress of type B occupies a volume of  $50m^3$ . These mattresses are to occupy the total volume of the ware house.

### **Task**

- (a) (i) Help Joram to determine the dimensions of the ware house.
- (ii) What will be the volume of the warehouse?
- (b) (i) Write down the mathematical relationships representing the number of each type of mattresses Joram is to purchase.
- (ii) Represent the relationships in b(i) above on a rectangular Cartesian plane to show the feasible region
- (iii) Help Joram to know the number of mattresses of each type that will be stored so that the ware house can have the highest capacity of the mattresses

## **SECTION B**

*This Section has two parts; I and II*

### **Part I**

*Answer **one** item from this part*

### **Item three**

“*Double M Companies*’ limited” is a company that deals in imports of vehicles from three countries Japan, Germany and Italy. The company wants to know the most liked vehicles so that it increases the number of vehicles imported from that country. The company also wants to start importing vehicles from China if the probability of customers who like vehicles from neither of the three countries they import from is greater than 0.35. The company decided to collect data from the customers who came to buy vehicles in a particular week and the following is the data collected. Out of the 58 customers interrogated, 7 like vehicles from all the three countries. 24 like vehicles from Germany and 5 like vehicles from Italy only 13 like vehicles from Japan and Germany.

16 like vehicles from Germany and Italy and 3 like vehicles from Japan only. 38 customers did not like vehicles from Japan

**Task**

- (a) Basing on mathematical calculations, help the company to know the country from which it must increase the number of vehicles imported.
- (b) Will the company start importing vehicles from China or not?
- (c) How many customers liked vehicles from each of the countries Japan, Germany and Italy?
- (d) What is the probability of selecting a customer who did not like a vehicle from Italy?

**Item four**

In preparation for the sports day, Margie and Jesca went to the market to buy some items. Margie went with Shs. 35,000 while Jesca went with Shs. 25,000. Margie bought 2 loaves of bread, 3kg of sugar and 4 pencils. Jesca bought 3 loaves of bread, 4kg of sugar and 2pencils. A loaf of bread, a kg of sugar and a pencil was sold at shs.5500, 3700 and 350 respectively. Margie and Jesca remember that one of them went with less money but they cannot tell who it was since during buying, they combined all the money they had

On the sports day, Maria, Tracy and Molly participated in a game where each of them picked 2 identical sweets from a box, one after the other without replacement. The box contained 4 green, 3 red and 6 yellow sweets. Maria picked sweets of the same colour, Tracy picked sweets of different colours and Molly picked the second sweet as red. The prizes were distributed to them according to the probability of picking. First, second and third prize were given out.

**Task**

- (a) Help Margie and Jesca to know who could have gone with less money?
- (b) Who of Maria, Tracy and Molly won the first prize?

## Part II

Answer **one** item from this part

### Item five

Umaru works with a box manufacturing company. He has been contacted to make a foldable box with rectangular faces. The box is to be made from a material whose area is  $422.8\text{cm}^2$  and its base will measure  $12.4\text{cm}$  by  $5.5\text{cm}$ . Umaru is finding it hard to come up with a sketch he will follow to arrange all the faces for the box to fold and close; and the height of the box that he will make using the provided information

For each box, Umaru is paid Shs. 950 and he has been tasked to make 500 boxes. He has a plan of using all the money he will be paid to buy a cow which he will sell after 2 years because he targets to get Shs. 1,600,000 out of it. The cow appreciates at a rate of 80% per annum and he does not know if he will achieve his target or not

### Task

- (a) (i) Help Umaru to come up with a sketch showing the details he needs
  - (ii) Calculate the height of the box he is to make
  - (iii) Determine the volume of the box he is to make
- (b) Will Umaru achieve his target?

### Item six

You are the Human Resource of an organization. To go to the Organization offices, you drive from home in the direction of  $N45^\circ W$  for  $425\text{m}$  to reach the main road. From the main road, you drive at a bearing of  $180^\circ$  to reach the offices. The total distance travelled from home to the offices is  $725\text{m}$

On reaching the offices, the manager informs you that the organization should recruit more employees and there is 10 million shillings available every month to cater for their monthly salaries.

In this organization, an employee pays a total monthly tax of Shs. 26,900 basing on the tax structure below

<b>Taxable income (Shs)</b>	<b>Rate (%)</b>
100,000 – 200,000	5
200,001 – 300,000	15
300,001 – 450,000	20
450,001 – 600,000	25
Above 600,000	30

Each employee is also entitled to the following tax free allowances;

Daily transport of Shs. 3000, medical of Shs. 40,000, annual insurance of Shs. 300,000, water and electricity of Shs. 75,000 and housing of Shs. 90,000

**Note** that a month has 30 days

### **Task**

- (a) (i) Describe the direction of your home from the Organization offices
- (ii) How long will it take your messenger walking at an average speed of 20m/minute from the offices to reach your home using direct route?
- (b) (i) Basing on mathematics evidence, how many employees will the organization have to recruit to fit the available money?
- (ii) What percentage of the employee's salary goes to tax?

**END**