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MATHEMATICS
Paper 1
2024
 $2\frac{1}{4}$ hours

Uganda Certificate of Education
MATHEMATICS
Paper 1
2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

*This paper 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 sheets provided.*

Graph paper is provided.

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

SECTION A

Answer **all** items in this section.

Item 1

(20 scores)

During their baking lesson, the students were given a recipe for 10 scones using the following ingredients.

- 80g butter
- 350g self-raising flour
- 30g sugar
- 2 eggs

However the student has the following ingredient and is preparing for the exhibition to take place at school and wishes to bake 25 scones for the exhibition because he expects parents and visitors to support his entrepreneurial venture.

- 100g butter
- 1kg self-raising flour
- 45g sugar
- 8 eggs

Task:

- Determine if the student has enough of each ingredient to bake 25 scones based on the recipe.
- Determine how much more of each ingredient the student needs to buy.
- If the prices of the ingredients are as follows:
 - Butter—UGX 5000 per 100g
 - Self –raising flour UGX 6000 per kg
 - Sugar—1000 per 50g
 - Eggs—400 per eggs

Calculate the total cost for the additional ingredients needed.

- Determine how much the student should sell each scone. Electricity and other expenses are provided free by the school.

Item 2

(20 scores)

Your uncle has a small bakery and plans to bake two types of loaves of bread : whole wheat bread and white bread . Due to the bakery's oven capacity, your uncle can bake atmost 15 loaves of bread in aday . He wants to bake atleast 3 loaves of whole wheat bread. Additionally he wants bake more whole wheat bread than white bread because it is more popular among his customers.

- Whole wheat bread is sold at shs 6000 per loaf
- White bread is sold at shs 5000 per loaf

To cover his costs and make a profit, your uncle needs to earn more than **UGX 300,000** from the sales each day.

Task:

- (a) Write mathematical statements that show the relation between the whole wheat bread and white bread.
- (b) Show the feasible region of the relation on the Cartesian plane.
- (c) How many loaves of each type should your uncle bake in order to maximize the profit?
- (d) What is the minimum number of loaves he can bake and still make a profit?

SECTION B

This section has two parts; **I** and **II**

Part I

Answer **one** item from this part

Item 3

(20 scores)

In a school survey, 200 students were asked about internet usage habits .They were asked to choose from three activities : Social media (like face book and tik tok), Academic Work (such as research and homework) ,and Playing games .The results showed that 165students use the internet for social media , 130 use it for academic work, and 100 use it for playing games . Among them, 70 students use it for both social media and academic work only , 60 use it for both social media and playing games , and 50 use it for both playing games and academic work .Additionally , no students exclusively use the internet for playing games . Now the school needs to decide whether to set rules if more than **60%** of students spend their internet time on social media.

Task:

- (a) Calculate how many students use the internet for at least one of these activities
- (b) Determine how many students don't use the internet at all
- (c) Estimate the percentage of students who use the internet solely for academic work
- (d) Based on the findings, advise the school on whether to implement the rules or not

Item 4

(20 scores)

A certain company in Kampala is analyzing the optimal departure time for its 40 employees to ensure they reach home by 6:00pm, minimizing their commute time and avoiding peak traffic congestion. The company conducts a survey to track the times employees typically arrive home after work, measured in minutes past 5:00pm.

11	66	21	88	33	67	41	45	47	41
27	62	32	43	31	34	66	20	21	36
26	75	80	45	12	44	58	48	42	38
56	63	68	24	21	65	68	63	72	38

Task:

- Based on calculations using the collected data, suggest an opening time for voter registration centers.
- Following advice to open registration centers when at least 50% of expected citizens have arrived, determine the opening time.
- As the Electoral Commission of Uganda, which of the two suggested opening times from (a) and (b) would you choose, and why?

Part II

Answer **one** item from this part

Item 5

(20 scores)

Your relative, is planning to start a small bakery business and seeks your advice on nancial matters related to her venture. She plans to invest a total of \$10,000 into the business and wants to understand the nancial implications of di erent nancing options. She has approached two money lenders and she is asking for your input before she takes on the decision.

Lender 1: Your relative, wants to borrow UGX 50,000,000 from a local bank to purchase baking equipment. The bank offers her two different repayment plans:

- Option 1: Simple Interest - The loan is offered at an annual interest rate of 20% and to be paid after 2 years.
- Option 2: Compound Interest - The loan is offered at an annual interest rate of 4% and is to be paid after 2 years

Lender 2: Your relative is considering a hire purchase agreement with a bakery equipment supplier. The total cost of the equipment is \$5,000, and the hire purchase agreement specifies a down payment of \$1,000 followed by monthly payments of \$400 for 24 months. The supplier will consider a constant dollar rate at 1\$= UGX 3,800 Task:

- Calculate the total repayment amount for each financial option over the loan term and compare them to determine which option would be more cost-effective for your relative bakery business.
- Analyze the monthly cash flow implications for your relative, under each financing option, considering her ability to manage operational expenses alongside loan repayments.
- Based on your calculations and analysis in (a) and (b), provide your relative, with a recommendation on which financial option would be optimal for her bakery business, taking into account both total repayment amount and monthly cash flow considerations.

Item 6*(20 scores)*

A group of tourists has just arrived at Entebbe International Airport in Uganda for a safari adventure. They are interested in reaching the source of the Nile in Jinja. The touring company has approximated the distance from Entebbe to Jinja to be about 94 km, which should take around 3 hours without traffic, assuming an average speed of 30 km/h for the whole journey. Here are the directions they are following:

- From Entebbe Airport, travel north for 35 kilometers to reach Kampala, the capital city.
- From Kampala, head east on the Jinja highway. As they approached Mukono, approximately 25 km from Kampala, the guide was alerted by a friend coming from Jinja to change the route and use the Kayunga road due to an accident in Mabira. The driver changed the route at Mukono and went in the northeast direction to Kayunga, approximately 45 km away.
- From Kayunga, they headed to Jinja on a bearing of 130^0 , which took them 1 hour and 44 minutes as they enjoyed the scenery along the roadside.

Task

- (a) Describe the direction from Jinja to Entebbe.
- (b) How far is it from Mukono to Jinja using the direct route instead of the Kayunga route?
- (c) How long does the journey from Entebbe to Kampala take?
- (d) If each liter of fuel costs UGX 4900 and the car van consumes 1 liter per 10 km, how much fuel and money would they have saved if there was no accident in Mabira?
- (e) How much extra time did they spend on the road due to the detour, and what recommendations would you make to avoid such delays in the future?

END