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MATHEMATICS
Paper 1
Jul./Aug. 2024
2¼ hours

WAKISO-KAMPALA TEACHERS' ASSOCIATION (WAKATA)

WAKATA MOCK EXAMINATIONS 2024

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.

Neat work is a must!!

SECTION A

Answer **all** *items in this section.*

Item 1

A park ranger plans to inspect three wildlife observation points: Point **X**, which is 10 km north of his current location, Point Y, which is 8 km west of Point **X**, and Point **Z**, which is 6 km south of Point **Y**. After inspecting Point **Z**, he will return to his starting point using a direct route. His vehicle consumes **0.05 liters** of fuel per km, and he needs to calculate the total fuel required for the entire trip. Additionally, the ranger service is distributing new **GPS** devices. The large-scale distribution code is **3A7C**, where A represents ten and **C** represents twelve in the hexadecimal system. The distribution to each ranger operates in base five. The service must ensure proper allocation of **GPS** devices.

Task:

(a) How much fuel is required for the journey?

(b) (i) Convert the large-scale distribution code to the decimal system.

(ii) Convert the decimal number to base five to determine how many GPS devices each ranger will receive.

(c) Two ranger patrol teams operate on different schedules. The first team patrols a nature reserve every 25 minutes, and the second team patrols every 40 minutes, starting from 10:00 PM. Determine the time before midnight when both teams will meet at the reserve.

Item 2

A bakery has UGX. 700,000 to produce two types of cakes, Cake **A** and Cake **B**. Each cake type requires specific ingredients, and the goal is to minimize the total cost while meeting the demand for both cakes. The production involves two main ingredients: Ingredient X and Ingredient **Y**. The cost and availability of these ingredients are limited, and each type of cake requires different amounts of these ingredients.

Given Data:

- Cost per gram of Ingredient **X**: UGX.3000
- Cost per gram of Ingredient **Y**: UGX.5000
- Ingredient requirements per gram of Cake **A**:
  - Ingredient **X**: 4 grams
  - Ingredient **Y**: 2 grams
- Ingredient requirements per gram of Cake **B**:
  - Ingredient **X**: 3 grams
  - Ingredient **Y**: 5 grams
- Availability of ingredients:
  - Ingredient **X**: 80 grams
  - Ingredient **Y**: 90 grams
- Demand:
  - Cake **A**: At least 7 grams
  - Cake **B**: At least 10 grams

Task:

(a) Write the constraints for ingredient limitations and demand requirements.

(b) Show the feasible region of the constraints on the Cartesian plane.

(c) Determine how much the bakery can save on production costs based on the optimal solution.

SECTION B

This Section has two Parts; **I** *and* **II**

Part I

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

Item 3

During a health initiative in your town last year, the following ages represent the participants who improved their health:

22, 35, 44, 31, 48, 53, 39, 41, 57, 60, 28, 36, 50, 55, 37, 43, 59, 63, 67,
21, 34, 42, 49, 52, 56, 61, 65, 71, 32, 46, 40, 45, 54, 58, 64, 68, 25, 38.

Task:

(a) Help the health coordinator organize the ages of the participants to aid interpretation.

(b) Construct a representation of the data to show the age distribution of the participants who improved their health.

(c) (i) Based on your calculations, determine which age group was most represented among those who improved their health.

(ii) Provide recommendations to the health coordinator based on your data analysis.

Item 4

A market survey of 200 sellers revealed that 110 sellers trade in vegetables, 130 sellers trade in fruits, and 90 sellers trade in grains. It was also noted that some sellers trade in more than one type of produce: 50 sellers trade in both vegetables and fruits, 40 sell both fruits and grains, and 30 sell both grains and vegetables.

Task:

(a) Determine the number of sellers who trade in exactly two types of produce.

(b) Is it possible that some sellers did not trade in any of the types of produce? Justify your response.

(c) Based on your calculations, provide recommendations to sellers trading only one type of produce.

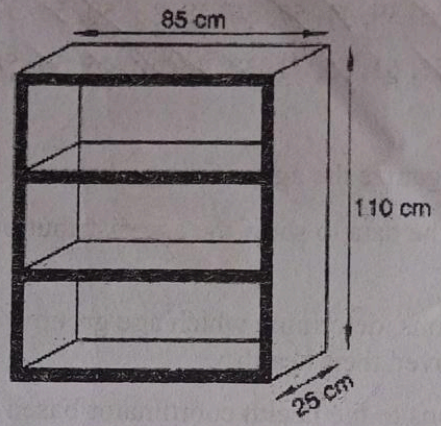
Part II

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

Item 5

In a small workshop, a carpenter is crafting a wooden bookshelf for a client as shown in the figure below. The bookshelf measures 110 cm tall, 25 cm deep, and 85 cm wide, with each part made from 5 cm thick planks. The external surfaces will be polished, and the inside surfaces will be painted.

External surfaces cost **UGX. 20** per cm^2 for polishing, while internal surfaces cost **UGX. 10** per cm^2 for painting.



Task:

(a) Determine the total surface area of the bookshelf that requires polishing and painting.

(b) Estimate the total cost for polishing the external surfaces and painting the internal surfaces of the bookshelf.

(c) Should the carpenter consider offering a discount on the finishing costs to the client? Provide a recommendation based on your cost analysis.

Item 6

A community owns a rectangular piece of land, with sides measuring 700 meters and 900 meters. To prevent encroachment, the community leaders decided to construct a circular boundary fence that touches each corner of the rectangle. The labor cost for the fence is 20 US dollars per meter, and the construction materials amounted to **UGX. 9,000,000**. Use an exchange rate of **$1 = UGX.3800**.

Task:

(a) Calculate the area of the piece of lańd owned by the community.

(b) With the aid of an accurate diagram:

(i) Estimate the total cost of constructing the fence.

(ii) Determine if the community has taken over land that belongs to other people. Justify your response.

END