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MATHEMATICS
Paper 1
Jan/Feb 2025
 $2\frac{1}{4}$ hours

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MATHS LEARNERS UGANDA EXAMINATIONS

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 1

A certain small village in Uganda has always complained of famine. In the small village, there is a community garden where the villagers grow various vegetables. The garden is divided into sections, and each section is managed by a different family. The sections are in the ratio of 3:4:5. One day, the village council decided to build a water tank to irrigate the garden. The volume of the water tank is given by the formula $v = a^3$, where a is the side length of the cubic tank. The side length a is $\sqrt{50}$ meters. The villagers also decided to distribute the harvested vegetables among first, second and third family in the ratio of 2:3:4. The total harvested vegetables received by the first family is 40 kg. Additionally, the villagers noticed that the growth rate of the vegetables follows an exponential pattern. The initial number of vegetables is 10 and it doubles every week

Task

- If the smallest section of the garden occupies $15m^2$ of space. determine the amount of space taken up by the largest section and the volume of the water tank in its simplest form.
- Determine the amount of harvested vegetables received by the second and the third family.
- how many vegetables will there be after 4 weeks?

Item 2

A farmer in Uganda has a piece of land that he wants to use for planting maize and beans. He has a total of 10 hectares available. Each hectare of maize requires 2 units of fertilizer and 3 units of labor, while each hectare of beans requires 1 unit of fertilizer and 2 units of labor. The farmer has a maximum of 16 units of fertilizer and 18 units of labor available. Additionally, he wants to plant at least 1 hectare of maize and at least 2 hectares of beans to ensure a good harvest. Each hectare of beans yields a profit of UGX80000 and each hectare of maize yields a profit of 88000. Determine the amount of units of fertilizer and the units of labor the farmer must employ to maximize profits.

Task

- Write down mathematical statements to represent the relation
- Determine the amount of units of fertilizer and the units of labor the farmer must employ to maximize profits.

Turn Over

SECTION B

This Section has two Parts; I and II

Part I

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

Item 3

The district member of parliament has always encouraged planting of trees in his home district. Farmers in district with trees with average length of more than 26mm are always given financial support by the member of parliament. Ojok is a farmer in the district. He recorded the length (in mm) of his planted trees as shown below

Length (mm)	11-15	16-20	21-25	26-30	31-35	36-40	41-45
<i>frequency</i>	2	4	8	14	6	4	2

Task

- Work out the length of the majority of the trees.
- State whether Ojok is among the farmers to receive financial support from the member of parliament.
- What is the chance that most trees are of length above/below the average?

Item 4

A parent wanted to make shopping of scholastic materials for his children who were going back to school for a new term by the names of Jane, Mary and Doreen. They budgeted as below basing on the list of requirements that they were given by their class teachers.

- Jane: 6 exercise books, 3 pencils, 2 Graph books, 3 pens
- Mary: 3 pencils, 1 Graph book, 6 exercise books, 3 pens
- Doreen: 2 Graph books, 4 exercise books, 3 pencils and 5 pens

At that time the prices were 1 Graph book Shs2000, 1 pencil Shs100, 1 exercise book Shs1,500 and 1 pen Shs500. On reaching school, they found out that the canteen manager had increased prices of each of the items by 10% and that the school administration had decided that on each item listed, they should buy 2 more since the term would be extended by two weeks when the term ends in order to compensate for the time students had lost the previous term. Before leaving their home, they were given by their father Shs200,800 for the clearing process at school and then afterwards they would share equally the remaining money to be used as their pocket money.

Task:

- Assuming they were to buy the items before going to school, using the matrices help the father to determine how much he would give to each child.
- By use of matrices determine how much each child paid to the canteen attendant in order to acquire the items.

Turn Over

- c) Help the children determine how much each shared as pocket money after buying the items from the school canteen.

Part II

Answer **one** item from this part.

Item 5

An athlete is training for a marathon due to take place in France this coming year. She starts her run at a village trading centre. First, she runs 4 km due north to reach a sub-county. she then changes direction and runs 3 km on a bearing of 60° to the district headquarters. Two similar cylindrical tanks, blue and red in colour are always sold at the trading centre. The blue tank has a base radius of 16cm and can hold up to 5000cm^3 of water while the red tank can hold up to 20 litres of water. The blue tank is always placed on a rectangular carpet with it ends at positions (2,2), (8,2), (8,4) and (2,4). Juliet wants to buy the blue tank but wants the position of the carpet changed by 90° about the point (0,0) for her to see the tank properly.

Task

- Determine the distance from the village trading centre to the district headquarters
- Determine the base radius of the red tank.
- Using a suitable illustration, write down the coordinates of the new position of the carpet.

Item 6

Your brother, Otema, has been dreaming of buying a new expensive nice laptop for a very long period of time. He has been saving money in the bank for four years to meet his dream. He has been saving equal amount of money each year. Recently he bought the new laptop on hire purchase by first making a down payment of UGX1800000 using 20% of his saved money in the bank. When unfolded completely, the new laptop makes 60° with its two sides that measure 80cm and 90cm. Otema will paying UGX120000 monthly installments for 2 more years to complete the purchase of the laptop.

Task

- How much money did he save per year?
- Work out the total cost of the laptop and the amount of money he would save by purchasing the laptop on cash term if the cash price of the laptop is UGX20,000,000
- Using the knowledge of geometric construction, make accurate diagram of the laptop when unfolded completely.

END

Prepared by Sam Ogwang Otema;

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