

456/1
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)

The S.4 candidates of your neighboring school have organized a thanksgiving party to thank God for making it to this time of their studies. The class has four streams A, B, C and D and they plan to buy their head teacher a gift. You want to organize a similar function at your school and you also have exactly the same number of candidates as the neighboring school with the same number of streams. So they mobilized themselves as follows;

Stream A contributed one hundred thirty-three thousand two hundred fifty shillings. Stream B contributed one and half times the amount of Stream A. Stream C contributed 20% more than that of Stream A while Stream D contributed a fraction which is a fifth less that of B of the amount of A contributed. The class teacher contributed the balance required to make UGX 800,000 which was the cost of the gift.

On the day of Prom, the money was given to the class teacher to pick the gift from the nearby shop. From school, she used a boda-boda moving at 60kmh^{-1} , they moved for 30 minutes due east and then 40 minutes due north to reach the shop. She wants to return to school as quickly as possible.

Tasks:

- (a) Help design a budget contribution for the four streams of your class.
- (b) Arrange the contributions in ascending order, and advise how the contributions would be made fair.
- (c) How long will it take the teacher to return to school.

Item 2

(20 scores)

Your school intends to construct an office block which requires atleast 35 tonnes of sand. The school is to hire a lorry and a tipper truck with capacities of 7 tonnes and 5 tonnes respectively to transport the sand. The cost per trip either by lorry or by tipper truck is **UGX300, 000**. The money available for transformation was **UGX1, 800, 000**. The number of trips made by the lorry must exceed those made by the tipper truck.

- (a)
 - (i) Write down inequalities to represent the given information.
 - (ii) Plot these inequalities on the same axes, shading the unwanted regions.
- (b) From your graph in (a) (ii) above. List all the possible numbers of trips that each vehicle can make so as to maximize the total tonnage of sand transported.
- (c) Find the number of trips by each vehicle that made the greatest total tonnage.

SECTION B

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

Part I

Answer **one** item from this part

Item 3

(20 scores)

To enhance the fields of Rice, Beans, Sugarcane and Peas in Iganga district, the ministry of Agriculture's Farmer Training and Capacity Building program conducted a survey yielding the following findings: Among the 80 rice farmers surveyed, 45 also grow beans. 60 cultivate sugarcane and 5 focus solely on peas and rice. Additionally, 5 farmers dedicate their land solely to rice. The number of farmers who grow beans, sugarcane, peas and rice is equal to those who grow peas, sugarcane and rice. Moreover, the farmers who cultivate rice and sugarcane only are equal in number to those who grow rice, peas, and beans and a 5 fewer than those who grow all four crops.

The ministry plans to provide support to these farmers as follows:

- A farmer who cultivates all four crops (beans, rice, sugarcane and peas) will receive a package consisting of 4 tractors and a cash grant of **UGX 3,000,000**
- One who plants only three crops will receive 3 tractors and **UGX 2,000,000**
- A farmer who grows two crops will only receive 2 tractors and **UGX 1,500,000**
- For a single crop will receive only 1 tractor and **UGX1,000,000**

This support aims to motivate farmers to diversify their crops and boost their productivity

The ministry needs to calculate the total number of tractors for farmers based on the number of tractors needed for each group with each tractor costing **UGX 68,000,000**

Task:

- (a) Assist the ministry in determining:
- (i) The total number of farmers cultivating all four crops
 - (ii) The number of farmers growing only 3 crops
 - (iii) The chance of selecting farmer who grows only two crops in Iganga district
 - (iv) The likelihood of selecting a farmer who does not grow peas
- (b) Set total funding required for the ministry's farmer support initiative.

Item 4

(20 scores)

The uniform office of your school has made an order for the purchase of house t-shirts for the beginning of next term.

Colours	Specifications
Red	10 small, 5 medium, 30 large and 5 giant
Blue	40 medium and 20 large
Green	20 small and 20 large
Yellow	20 medium and 20 giant

The table below shows the cost for each size of shirt.

	<i>Size</i>			
	<i>Small</i>	<i>Medium</i>	<i>Large</i>	<i>Giant</i>
Cost (UGX)	9000	9600	10,500	10,000

The school administration also aims to enhance the mathematical abilities of senior three students. Last year the student achieves an average score of 60% by the end of term one and this years performance at the same stage is as follows. The administration intends to boost the department should the average mark this year be higher than that of last year.

30	47	26	86	64	87	49	24	26	43
38	52	44	45	56	59	76	46	27	89
57	89	73	90	48	58	51	88	32	56
62	68	52	66	67	69	49	97	92	66
74	36	32	54	39	35	69	92	50	71

Task:

- The school on addition pays a withhold tax of 18% of the value of the goods imported, help the uniform office make a budget for the purchase of the uniforms.
- Advise with basic reasoning whether there is need to boost the department.
- Help the department find how many students deserve extra help from the teachers.

Part II

Answer **one** item from this part

Item 5

(20 scores)

A hawker who sells watches leaves his home in Lambu town at 0600 hours and moves to Mbuya town which is 165 km north of Lambu town. From Mbuya town, he moves east wards for one hour at a speed of 150 kmh^{-1} to Katoomi town. He then heads to Nabuti TC which is in a direction of $S20^{\circ}E$ and moves at a speed of 45 kmh^{-1} for 2 hours. From Nabuti TC, he moves South wards to Tanda market which is 135 km away.

The hawker buys golden and silver watches at Ugx. 25,000 and

Ugx 20,000 each respectively and sells them at Ugx 30,000 each and

Ugx 25,000 each respectively. He sells the watches at a discount of 5% off the total cost for any customer who buys more than 2 watches. While in Tanda market, he meets his friend who buys 3 golden and 5 silver watches.

In the evening, he uses the direct route and returns home in Lambu at 8:00pm. In an hour's time, he receives a call from his brother in Canada. The call lasted for a quarter an hour and Uganda's time is 7 hours ahead of Canada's time.

Task:

- (a) What direction and distance did the hawker take through the direct route?
- b)
 - (i) help him record the profit he got that day?
 - (ii) How much did the watches cost his friend?
- (c)
 - (i) How much time did he spend away from home?
 - (ii) At what time did his brother ended the call end?

Item 6

(20 scores)

Your school is faced with a problem of water supply. The headteacher has instructed the bursar to contract a water fetching company in the locality to fill the newly bought water tank at the school within a period of not more than two weeks using an effective and efficient water fetching system.

The water company can either use **jerrycans** and **bucket** for fetching the water as shown below.



The school has a tank with a base of diameter 280 cm and height of 4 m and the jerrycans are of dimensions of 20 cm by 25 cm by 40 cm while the buckets each has diameters of 400 mm and 200 mm respectively.

In a day, the company can only fetch 120 Jerrycans of water or 100 Buckets. The cost of water from the commercial Reservoir is **UGX 5** per litre for either bucket or jerrycan. (**1 litre = 1000 cm³**). The transport charge per Jerrycan is **UGX 300/=** and **UGX 400/=** per Bucket. The school uses **560 litres** of water on a daily basis. (Take $\pi = \frac{22}{7}$).

The school management policy requires that the water budget should always be submitted **three weeks** before the tank becomes empty to avoid any crisis.

The bursar would like to make a budget in order to get money from his headteacher to facilitate the work but he is uncertain of the suitable system of fetching water to choose and the total amount of money he can request from the headteacher.

Task

- (a) Help the bursar to make the right decision by choosing the most suitable method of fetching water that meets the requirements of his headteacher.
- (b) With reasons, advise the school bursar when exactly he should submit the Water budget to the headteacher.

END