Students Name: .....

School Name:..... Signature .....

456/1

MATHEMATICS

Paper 1

2 ¼ Hours

LITTA JOINT MOCKS 2024

Uganda Certificate of Education

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WORDS! WORDS! WORDS!

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 (40 SCORES)

Answer all items in this section.

Item One:

A country is divided into four different regions; Northern, Southern, Eastern and Western. In the just concluded National Census, it was established that the population of the country was 13,400,000 people. In addition, the Western region's population is 50% more than the population of the Eastern region. The Northern region's population $\frac{1}{4}$ of the Eastern region's population. Finally, the population of the Southern region is $\frac{2}{5}$ of the population of the Western region. The National Bureau of Statistics predicts that the population of the country will be doubling every after 100 years according to the equation $P = 13{,}400{,}000(2)^{0.01n}$ where P is the population of the country at any time and n is the number of years.

Tasks:

(a) Determine the number of people in every region of the country.

(b) Help the national planners to predict the number of people in the country after 200 years.

(c) Use your knowledge of indices to predict the number of years that will pass for the population of the country to become 107,200,000.

(d) In your opinion, why do you think it is important for any country to carry out a population Census?

(20 scores)

Item Two

Jeremiah plans to import two types of mobile phones from Dubai: Docomo and Oppo. He has been informed that each Docomo phone will cost 200,000 shillings, and each Oppo phone will cost 300,000 shillings. He intends to spend at least 1,000,000 shillings more on Oppo phones than Docomo phones. However, he does not have more than 3,600,000 shillings to spend. Based on his market survey, he can sell each Docomo phone for 280,000 shillings and each Oppo phone for 400,000 shillings. Despite this, he has decided that the number of Oppo phones imported should be less than double that of Docomo phones. Given these constraints, he is now uncertain about the number of mobile phones of each type that he should import to maximize his profit margin.

Tasks:

(a) Write down mathematical expressions that represent all the constraints as set by Jeremiah.

(b) Using the Cartesian Plane, show the region that satisfies the mathematical expressions formed. Help Jeremiah identify the number of mobile phones of each type that he should import to maximize his profit margin.

(c) If each Docomo phone and each Oppo phone pays a tax of 15% and 20% of its cost price, help Jeremiah determine the net profit if he succeeds in selling all the imported phones.

(20 scores)

SECTION B (40 SCORES)

This Section has two Parts; I and II

Part I

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

Item Three

Mr. Ayesiga is seeking funding from the government to become a model farmer in Sheema District. The Ministry of Agriculture has informed him that he needs to demonstrate his ability to produce an average of 75 liters of milk per day over the next 60 days to be considered for recognition. As a result, he has chosen to keep a record of his daily milk production on his farm, and the findings are organized in the table below:

60	75	72	86	73	75	80	76	62	70
77	71	83	79	88	63	69	73	83	84
71	80	78	92	83	87	94	81	86	56
67	90	89	59	64	78	71	66	79	78
84	68	70	88	82	93	87	61	80	89
76	77	82	78	74	62	57	75	67	74

Tasks:

(a) Help Mr. Ayesiga determine whether the Ministry of Agriculture will consider him a model farmer in Sheema District.

(b) Provide the median capacity of Mr. Ayesiga's daily milk production over the 60 days.

(c) Advise Mr. Ayesiga on the measures he can take to increase the daily milk production on his farm.

(20 scores)

Item Four:

The Headteacher of Makondo High School plans to take the school team to a Sports Gala at the District Sports Arena. However, he doesn't know the exact number of students on the sports teams. The school has a Football team, a Basketball team, and a Volleyball team. From the data provided, it is known that there are **eighty-five** students on the Volleyball team, with **five** playing only Volleyball. Some **fifteen** students are playing only Football. **Sixty** students are part of both the Basketball and Volleyball teams. Additionally, **seventy** students are on both the Volleyball and Football teams. Lastly, **sixty** students are part of only two sports teams, and **thirty-five** students are not part of the football team. The Headteacher has arranged for a bus that can transport 75 students for UGX 350,000 per trip.

Tasks:

(a) Help the Headteacher to determine the total number of students on the school team.

(b) How many of these students play either football or volleyball but not both? Assume that a student is now selected randomly from the school team, what is the probability that the student plays only one type of sport?

(c) Advise the Headteacher on the total amount of money that he will need to put aside to cater for the transportation of the school team.

(20 scores)

Part II

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

Item Five

There are two different routes from Kamu Trading Centre to Jebu City. One is a direct route, whereas the other goes through two additional towns: Mekiti Trading Centre and Mato Trading Centre.

- Mekiti Trading Centre is located to the North of Kamu Trading Centre. A car traveling at a speed of 60 km/hr can cover this distance in 2½ hours.
- Mato Trading Centre is 120 km from Mekiti Trading Centre on a bearing of N30°W.
- Jebu City is positioned East of Mato Trading Centre, but on a bearing of 038° from Kamu Trading Centre.

To alleviate traffic through Mato Town Centre, the government has allocated funds to construct a new road connecting Mekiti Trading Centre to Jebu City.

Tasks

(a) How far is the distance between Mekiti Trading Centre and Kamu Trading Centre?

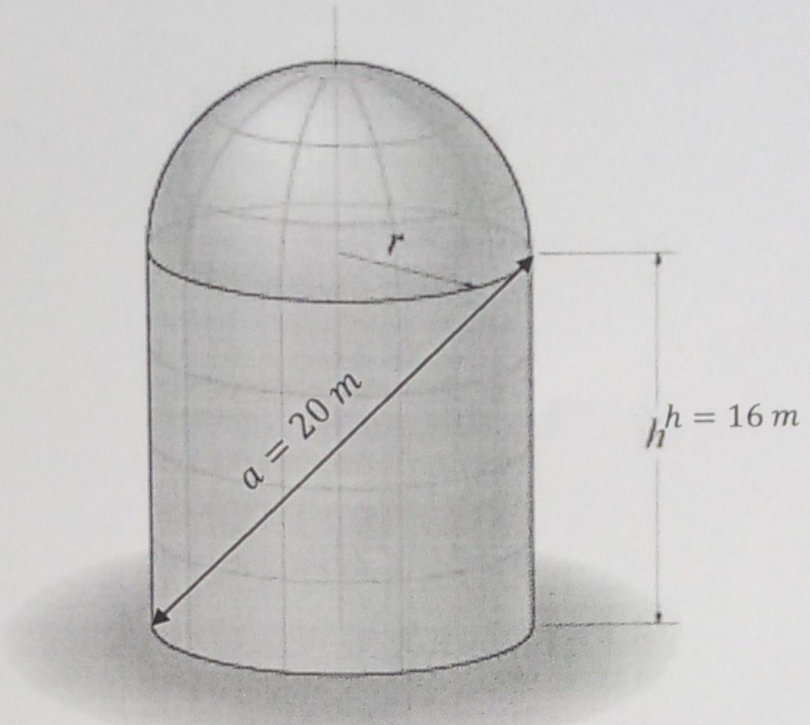
(b) Upon the completion of the new road construction, how long will it take to travel from Mekiti Trading Centre to Jebu City if the speed is 80 km/hr?

(c) Apollo intends to travel from Kamu Trading Centre to Jebu City via the direct route. He plans to begin the journey at 7:00 am to reach his destination by 11:30 am. Please advise on the appropriate speed for him to travel at.

(20 scores)

Item Six

A farmer wants to construct a water reservoir in his farm to enable him to keep enough water that can be utilized during the dry season. The tank is to have a cylindrical shape with a hemispherical cover at the top as shown in the figure below.



The engineer has advised the farmer to use stainless steel at a cost of shs 20,000 per square metre used. By his design, the height of the cylindrical section will be 16 metres and the diagonal line drawn from the base of the cylinder will be 20 metres.

Tasks

(a) By determining the radius of the reservoir, help the farmer to find the capacity of the tank that will be constructed.

(b) It is predicted that the dry season will have a total length of 96 days. The farmer will need a maximum of 24,000 litres of water per day during this time. If the reservoir was to be filled to full capacity, will the water stored be enough for the farmer?

(c) Help the farmer to estimate the minimum total cost of the stainless steel that will be needed to construct this reservoir.

(20 scores)

END