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



UGANDA NATIONAL EXAMINATIONS BOARD

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.

Your guardian has a budget of Shs700,000 for your school expenses. To get to the school where your guardian wishes to take you for A-level, your guardian drove 4 km east from your home to the stage and then 8 km north to reach there. However, you realized later that there was a direct route from home to school your guardian could have used.

On reaching the school, you found out that, the school fees, admission fees and uniform fees are Shs900,000, Shs100,000 and Shs350,000 respectively. The school also offers a bursary of; 60% off school fees, free admission and eighty-seven thousand five hundred shillings off uniform fees to those who got first grade and according to your results, you qualify for this bursary.

It also has **two** payment **plans** on school fees that the guardians can choose from and they are:

- Paying in two instalments that is to say; two thirds of the school fees at the beginning of the term and the balance at either visitation day or end of term.
- Paying in three equal instalments; at the beginning of the term, on visitation day and end of term respectively.

Task:

- (a) How far is it from your home to school if you travel through the direct route?
- (b)
 - (i) Since you qualify for the bursary, how much will you pay?
 - (ii) Will your guardian afford the school expenses according to his budget?
- (c)
 - (i) How much will those who are to pay school fees of Shs900,000, pay per instalment, according to each of the payment plans?
 - (ii) Which payment plan would you recommend for them and why?

Item 2.

You have friends who rear cows and goats. During the festive season, they want to sell **at most** 10 of their cows and **at least** 8 of their goats. They also want to ensure that the number of goats they sell are less than twice the number of cows. They also **do not want to** sell more than 20 animals all together. They wish to **maximise** sales by selling each goat at Shs200,000/= and each cow at Shs1.5 millions but they do not know the number of goats and cows to sell to fulfil their wish.

Task:

- (a) write mathematical statements that show the relation between the cows and goats.
- (b) Show the feasible region of the relation on the Cartesian plane.
- (c) Help your friends to determine the maximum amount of money they will possibly make from the sale of cows and goats.

SECTION B

This Section has two Parts; I and II

Part I

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

Item 3.

A day school holds a weekly assembly every Monday starting at 8:00 AM. The Head teacher has noticed a trend of learners arriving late for assembly. Since the school gates are opened at 7:30 AM, he decided to collect data from a sample of learners on their arrival times in minutes past 7:30 AM to make an informed decision about the assembly's start time. The collected data was as follows:

15, 18, 20, 22, 17, 25, 23, 28, 26, 21
30, 33, 35, 32, 36, 39, 42, 37, 41, 28
45, 48, 29, 31, 26, 27, 30, 33, 34, 31
28, 35, 40, 42, 37, 39, 36, 38, 29, 43
46, 47, 30, 32, 31, 45, 27, 44, 46, 49
52, 53, 55, 51, 50, 56, 57, 58, 59, 51

Task:

- (a) Giving a reason, based on calculations using the data collected, suggest the time the assembly should always start.
- (b) The deputy Head teacher advised the Head teacher to always start the assembly when at least 75% of the students are present. Based on the advise, determine the time the assembly should start.
- (c) If you were the Head teacher, which of the two suggested assembly start times from (a) and (b) would you consider more appropriate and why?

Item 4.

The Ministry of Health in Uganda is conducting a survey about the existence of malaria in three districts: A, B and C. The ministry will then come up with control measures if the chance of a person testing positive having visited at least one of the districts is above 50%. The Ministry has intentionally selected a sample of people who visited the three districts and tested them for malaria. The test results have revealed that 50 people who visited district A, 60 people who visited district B and 40 people who visited district C tested positive for malaria. Additionally, 20 people who visited both districts A and B, 10 people who visited districts A and C, and 15 people who visited districts B and C tested positive for malaria. The Ministry has also discovered that 20 people who only visited district C tested positive for malaria and 40 people who visited the three districts tested negative for malaria.

Task:

- (a) Determine the number of people that were tested for malaria by the ministry of health.
- (b) Calculate the probability of a person testing positive having visited at least one of the three districts.
- (c) Advise the Ministry of health, with a reason based on calculation, whether to come up with control measures or not.

Part II

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

Item 5.

Your uncle has offered to drive you to your friend's birthday party. He normally drives his car at an average speed of 50 km/h, so he requests you to get directions to the party reception and the time you are supposed to be there so that you decide on when you can leave home to reach on time. You were informed that the party will start at 2:00 PM and the directions are:

- From your home, take the north eastern direction and reach the supermarket that is 20 km away.
- Then take the road that is south of the supermarket and it will take you 45 minutes to reach the junction.
- From the junction, take the southwestern road and drive 25 km to reach the party reception.

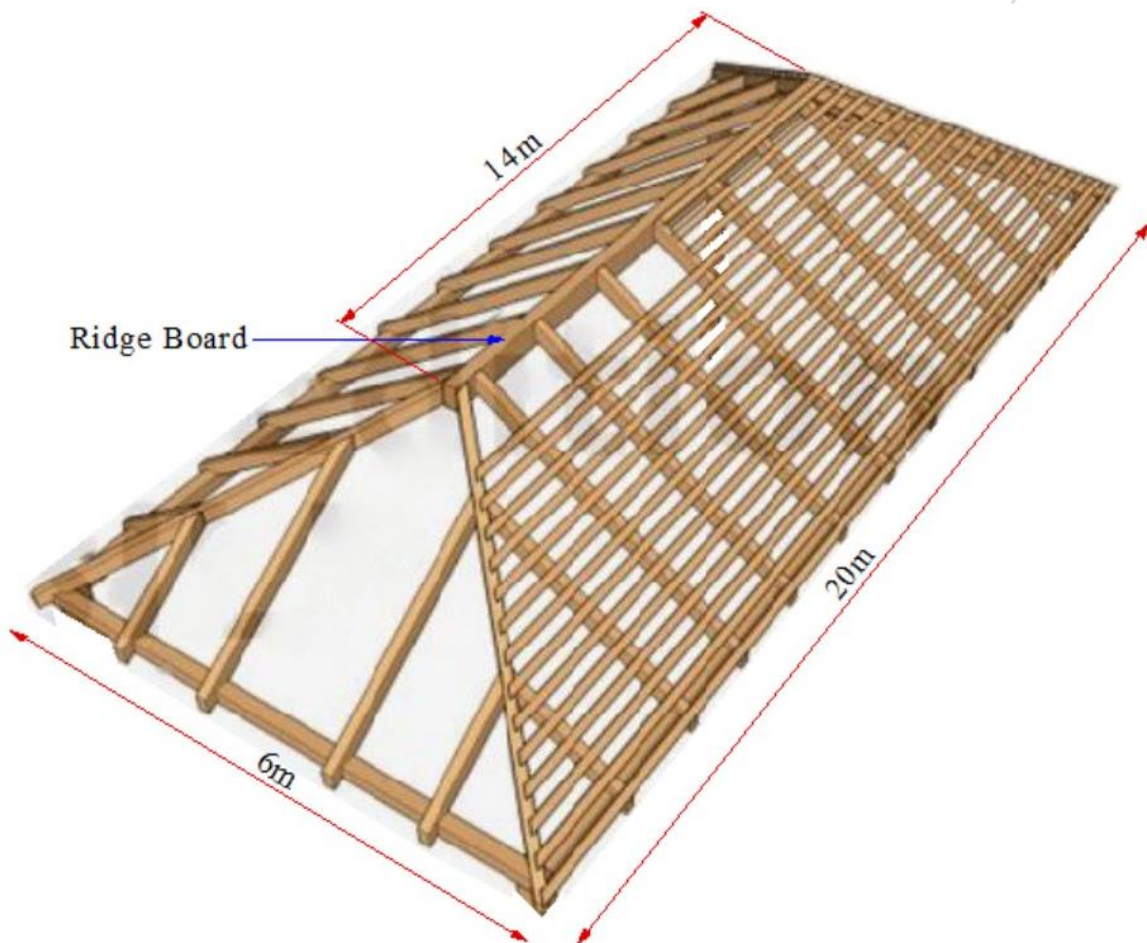
On reaching the party reception using the given directions, your friend remembers that there is a direct route from your home to the reception that you could have used but does not know how long it is.

Task:

- (a) (i) Describe the direction of your home from the party reception.
(ii) How far is the party reception from your home using the direct route?
- (b) What time would you have to leave home for you to reach the party reception on time, if you used the direct route?

Item 6.

Your neighbour has a building structure that is at a roofing stage with the roof frame installed as shown below:



The roof frame has a rectangular base with dimensions of 20 m by 6 m and the ridge board of 14 m centrally placed. The triangular faces are equilateral.

She wants to use iron sheets that are available in two types; type **A** and type **B**. The iron sheet of type **A** costs Shs33,000 each and that of type **B** costs Shs42,000. Each iron sheet has a length of 10ft and usable width of 2.623 ft. (1ft = 0.3m)

The hardware shop from which she wants to buy the iron sheets gives a discount of 6% on the total cost of every fifty (50) iron sheets of type **A** bought and a discount of 10% on the total cost of every seventy (70) iron sheets of type **B** bought.

She intends to borrow money from a bank to buy the iron sheets but she is not so sure of the amount to borrow.

Task:

- (a) Help your neighbour to estimate the amount of money to be borrowed from the bank for either type of iron sheets.
- (b) Give your neighbour advice, with reason(s), on the type of iron sheets to buy.