UGANDA TEACHERS' EDUCATION CONSULT (UTEC)

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.*

1. Namusoke, a Rotarian and a parent living in Nabingo village, is actively engaged in various business ventures, including selling Matooke fingers and bunches.

She purchases them at a cost of UGX 3.6 million and sells at a 25% markup.

She offers a 10% discount to her loyal customers and pays a 15% tax on her total sales.

She allocates 30% of her profits for school fees and uses the remaining profits for reinvestment in her business and community donations.

Specifically, she donates $\frac{1}{5}$ of her remaining profits after school fees has been deducted and the rest to the rotary club.

Support material

Due to the fatigue she experiences from managing her business, she fell sick and was diagnosed with a condition that requires her to take two types of tablets. Of which, One tablet must be taken every 6 hours, and the other every 4 hours. But she took both tablets at 9:00 AM.

Tasks:

a) As a student who learnt business mathematics, help her to calculate the;

(i) Time she will take both tablets at the same time again. Show your calculations.

(ii) Profit after applying the discount, tax and how much she can allocate to school fees, reinvestment, and community donation if she donates $\frac{1}{5}$ of her remaining profits after school fees. Show your step-by-step calculations.

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b)   If Namusoke wants to contribute to a community project that costs Ugx 500,000, determine how much more she needs to save if she allocates part of her reinvested profit to the project.

2.   Nabirye and Musa (bakers), received an order for 200 mandazi. Nabirye previously baked 48 mandazi using 2 kg of wheat and 168 mandazi using 7 kg of wheat. The customer wants some mandazi in polythene bags(x) and some in paper bags(y), with polythene-packed mandazi greater than those in paper bags. Polythene-packed should not exceed 100, and those in paper bags should be at least 60. The total packaging materials should be at most 200.

Task:

Help us to determine the;

a)   Mathematical relationship between the number of mandazi produced and the amount of wheat used.

b)   Amount of wheat needed for 200 mandazi.

c)   Mathematical inequalities for the number of polythene and paper bags.

d)   Highest number of polythene and paper bags to buy.

SECTION B
This Section has two Parts; **I** *and* **II**
Part I
Answer **one** *item from this part*

3.   At Wakiso College School, the entertainment prefect is tasked with selecting two types of movies to entertain students over the weekend. The options available are Romance (R), Musical (M), and Adventure (A). The prefect aims to choose two movie types that students enjoy, ensuring the combined preference probability falls within the range of 0.5 to 1. The research conducted reveals the following preferences among students:

420 like Romance, 460 like Musical, 340 like Adventure,

180 like both Musical and Adventure, 260 like both Romance and Musical, 150 like both Romance and Adventure, and 60 students are not interested in any type.

The number of students who like all three types is twice the number of those who like only Romance and Adventure.

Tasks:

a)   As a math student, help us to determine the
    (i)   Number of students who like all three types of movies.
    (ii)   Total number of students surveyed.

b)   Find the probability of selecting two movie types that students enjoy, ensuring the probability falls within the range of 0.5 to 1. Justify the selection.

4.

The Iganga District examination committee wants to determine the appropriate duration for the upcoming examination.

They are considering three options: 1hour, 2 hours or 2 hours and 30 minutes.

To make an informed decision, they sampled 300 candidates from various schools in the district and came up with histogram that indicated the time each candidate took to complete the examination.

The data collected is represented on the histogram below;

Class boundaries
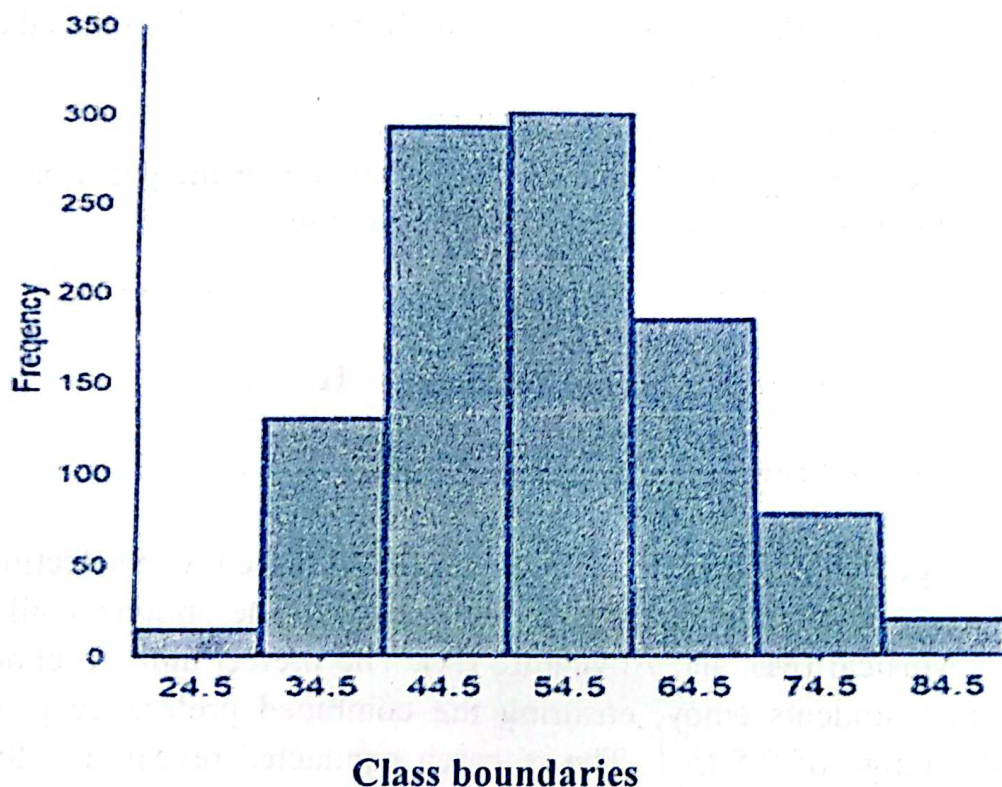
Task:

a) As a student of math, help us to;
   (i) Draw a frequency distribution table to the data collected in their analysis.
   (ii) Determine the Average time when all the students completed the examination.
   (iii) Draw an ogive and use it to determine the recommended median for the performance.

b) In their findings, they realized that the time allocation was the ratio of 2 : 4 : 5. Use it to determine the number of students who did the work in one hour, two hours and 2hours and 30 minutes.

5. Tenywa and Waiswa are working on a school project. They need to create a pencil holder using cardboard. They also want to shift a photo on the grid from A (1, 3) to A`(2, 5), B (3, 0) to B`(4, 2) and C (3 , 6) to C` (4 , 8). They need to create a triangle frame which passes through A`, B`, C` and a locus which is equidistant from P to A` for their art piece to be impressive.

Additionally they intend to make a big project after senior four examination which will boost their income in the holiday to help them secure school fees. They will buy cameras that can enlarge the photos by a scale factor of 2 to establish A`` , B`` and C`` of their photos. The community has allocated them land where they will put their business.

Task:
a) As a mathematics lover, help us to know how;
   (i) These coordinates were changing from A to A`
   (ii) Many square units of the remaining cut-off part by the triangle in the circle?
b) Tenywa instruct Waiswa to shift the photo of coordinates A`, B` and C` to obtain A``, B``, C``?
c) i) Plot the object and the images on the same axes
   ii) Use coordinate geometry to calculate the area of piece A``, B`` and C``.

6. Mr. Magemeso usually rides his bicycle to school at an average speed of 24 km/hr. He sets off from home at 7:00 AM and reaches school at 7:30 AM. His school is northeast of his home. Today, he has to first drive from home to his friend Ms. Apio's house to pick something up, then take a direct route from Ms. Apio's house to school. Ms. Apio's house is 10 km southeast of Mr. Magemeso's home.

In addition, Mr. Magemeso sells sweets at school on behalf of Ms. Apio. Each sweet costs UGX 500. Ms. Apio has instructed him to take a commission of 10% on the total sales he makes and give her the balance. Mr. Magemeso has sold 100 sweets and needs to determine how much to give Ms. Apio.

In the school's parking area, Mr. Magemeso usually parks his bicycle in the space marked P (2, 2) on a grid. While at position O (0, 0) on the grid but facing towards P, he saw that his space is occupied, and he needs to turn the wheels of his bicycle from O at a certain angle to park in the available space, marked P' (2, -2).

Tasks:

a) As a math student, help us to determine the distance from;
   (i) Mr. Magemeso's home to the school.
   (ii) Ms. Apio's house to the school.

b) Establish the time Mr. Magemeso should leave home to reach school at the usual time after stopping by Ms. Apio's house.

c) Determine how much money Mr. Magemeso should give Ms. Apio after taking his commission.

d) Calculate the angle Mr. Magemeso needs to turn his bicycle to park in the available space.

END