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MATHEMATICS
Paper 1
July - August 2025
2 ¼ hours

KAMPALA INTEGRATED SECONDARY SCHOOLS EXAMINATIONS BUREAU

KAMSSA

KAMSSA JOINT MOCK 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.***

 Turn Over

SECTION A

Compulsory

ITEM 1

Kago and Beatrice co-own a chemical manufacturing company. Kago initially contributed UGX 90,000 while Beatrice contributed UGX 120,000 as capital. The company produces industrial cleaning solutions by mixing different grades of chemicals, using automated machines to maximize productivity.

One day, Kago received a batch of 460 litres of Chemical **A**, which was 75% pure. He decided to mix it with another chemical of the same type but with 90% purity to obtain a final mixture that is 78% pure.

To mix and package the chemicals efficiently, three machines **A**, **B**, and **C** were used. Machine **A** can complete a full production cycle in 6 hours, **B** in 8 hours, and **C** in 12 hours. All machines were started at the same time. However, after 40 minutes, machine **A** broke down. Machines **B** and **C** continued working for another 1 hour before **B** ran out of fuel and stopped working for 20 minutes, during which machine **C** continued alone. **B** later resumed and worked together with **C** till the end of the cycle.

At the end of the year, the company made a gross profit of UGX 181,300. They agreed to reinvest 25% of this profit back into the business, and 40% was used for salaries and other annual expenses. The remaining profit was to be shared between Kago and Beatrice in proportion to their initial contributions.

At the end of the second year, the company made the same gross profit. The two partners then decided to dissolve the business and divide all the money available, including the reinvested profits from the first year and any remaining funds.

Tasks

a) Calculate the amount of the 90% pure chemical that Kago must add to the 460 litres to obtain a 78% pure mixture.

b) Find the fraction of the work that was still left after machine **A** broke down and hence determine the fraction of the work done by machine **C** working alone for 20minutes

c) Determine how much each partner received at the end of the first year and the total amount each partner received after dissolving the business at the end of the second year.

ITEM 2

At the start of the harvesting season, the cooperative management team of a refugee settlement in Kiboga district stocked enough maize flour to feed 1,540 refugees for 84 days. However, in the second week, the camp received an additional 295 refugees who were transferred from another settlement. This unexpected arrival raised concern among the supply team about how long the current food stock would now last. The camp officer, Mr. Walusimbi, called on trained volunteers to help calculate the new duration the food stock would sustain the increased population, so that they could plan better for the coming weeks.

In the same settlement, a women-led tailoring unit was established to empower residents and support the community economically. The unit produces two main types of garments: kitenge shirts (Garment A) and school uniforms (Garment B). Each kitenge shirt requires 3 metres of fabric, while each school uniform requires 2½ metres. The unit is supplied with 600 metres of fabric daily.

Due to production limits and agreements with suppliers, the unit is required to produce not more than 100 kitenge shirts and not less than 80 school uniforms each day. They make a profit of UGX 80 from each kitenge shirt and UGX 60 from each school uniform. The tailoring supervisor, Ms. Kamuhanda, requested help from the settlement's finance team to determine how best to allocate the fabric daily to maximize profit from their operations.

Task

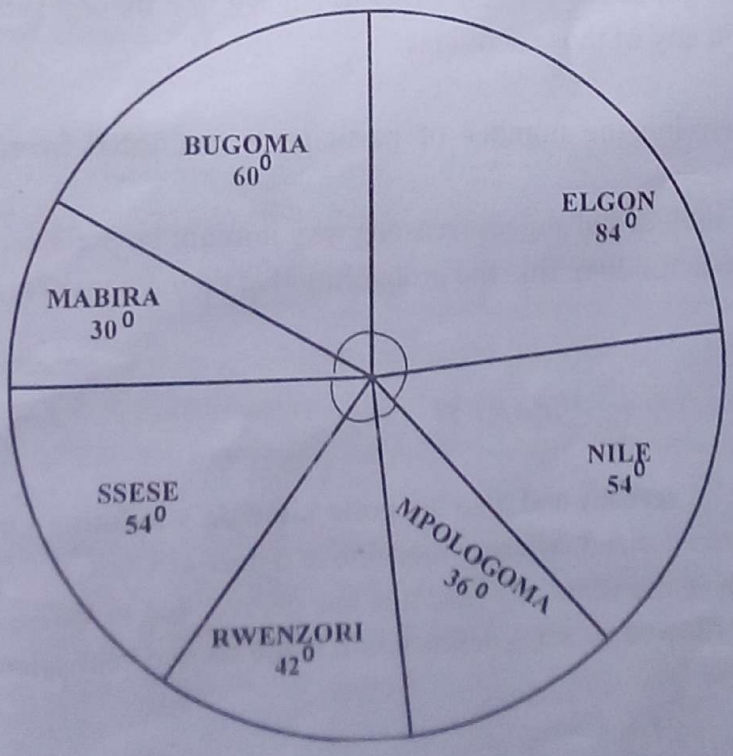
a) Determine how long the food will last after the arrival of the new refugees.
b) Write four inequalities to represent the tailoring constraints.
c) Determine how many garments of each type should be produced daily to maximize the profit.

SECTION B
PART I

ITEM 3

At St. Mary's Progressive High School, a total of sixty senior four students sat for a mathematics examination. Their scores were grouped into seven class intervals. To simplify the analysis, each interval was named after one of the schools' traditional houses as follows; 30-34, 35-39, 40-44, 45-49, 50-54,55-59, 60-64 and then named as Mabira House, Rwenzori House, Mpologoma House, Nile House, Bugoma House, Elgon House and Ssese House respectively.

The form four students population was then analyzed in the form of a pie chart as shown below.



a) As an S.4 student, use the information above to complete the table below.

Name	Marks	No. of students
Mabira	30 – 34	
Rwenzori	35 – 39	
Mpologoma	40 – 44	
Nile	45 – 49	
Bugoma	50 – 54	
Elgon	55 – 59	
Ssese	60 - 64	

b) From your table, using a working mean of 47, determine the average score of the students.
c) Draw a statistical graph and use it to determine the modal score.

ITEM 4

MR. MUSISI was organizing a community workshop and needed to prepare materials for the participants. He consulted Mrs. Namuyimba, the event coordinator, who provided details about the participants' preferences for three types of activities. Mathematics(M), Science(S) and Computer studies(C).

The number of participants who prefer mathematics and Science only is One-fifth of those who enjoy all three subjects.

Participants who like all three subjects are twenty times the number of who prefer only Science and Computer studies.

Those who prefer Mathematics only are five times as many as those who prefer only science.

Participants who prefer Mathematics only are $2\frac{1}{2}$ times those who prefer computer studies only.

The number of participants who prefer Mathematics and computer studies only is seven more than those who like science only.

A total of 200 participants are expected, with 24 likely to engage in only one subject and 41 participants do not take part in any of those activities.

a) Help MR. MUSISI, determine the number of participants interested in each subject combination.
b) Identify the most popular subject and suggest reasons why it might be preferred.
c) If one participant is chosen at random, find the probability that they are involved in at most one subject.

PART II

ITEM 5

Mr. Brian is a dedicated public servant and also supports his wife's tailoring business five years ago, he purchased a computerized tailoring machine at a cost of UGX 800,000 to help boost the family's income. Over the years, the machine has depreciated in value. In the first year, it depreciated by 20%, followed by a 5% depreciation in the second year calculated from its value at the start of that year.

During the third, fourth, and fifth years, the machine depreciated at a rate of 10% per year, each based on the value at the start of that year.

At the same time, Mr. Brian invested UGX 3,000 in a savings account that offered an annual compound interest rate of 15% for two years. He later wanted to compare the returns with what he would have earned under simple interest over the same period.

At the same time, Mr. Brian works with a private hospital in Kampala. His gross monthly income has allowances deducted from it before it is subjected to taxation, the allowances include; marriage UGX 25,000, unmarried, UGX 10,000, Insurance premium UGX 15,000 and children allowance 5,000 for those below 10 years and UGX 8,000 for those above 10 years and below 18 years.

Brian is married and a father to Lindah, James and Daniel aged 10, 14 and 20 years of age. He is insured and pays UGX 65,000 as income tax per month. The hospital has appointed a new accountant who wants to determine Brian's monthly gross income.

The income tax are indicated as below.

Income per month	Rate(%)
0 – 100,000	10
100,000 – 200,000	15
200,000 – 300,000	20
300,000 – 400,000	25
400,000 – 500,000	30
500,000 – and above	35

Task

a) Calculate how much less the tailoring machine will cost at the end of the fifth year compared to its original value and find by how much the compound interest exceeds the simple interest at 15% rate.

b) Find;

(i) Gross monthly income Brian earns.

(ii) Percentage of Brian's income that goes to taxes.

ITEM 6

Mr. Okello, a senior flight controller based at Entebbe international Airport, was conducting a training session for trainee pilots and electrical installation students. At exactly 9:30am, three planes **A**, **B** and **C** took off from a single point, **Airport P**, flying in different directions. Plane **A** flew on a bearing of 070^0 at a speed of 400km/h, plane **B** took a bearing of 290^0 flying at 500km/h, and plane **C** flew on a bearing of 162^0 at 300km/h. After exactly three hours, Mr Okello asked aviation trainees to make a scale drawing diagram showing the positions of the three planes.

At the same time, a group of electrical installation students at Uganda Technical Institute was working on a classroom simulation involving three light bulbs, labeled X, Y and Z, which were initially fixed in Room A at coordinates X(3,2), Y(-1,1) and Z(-3,-1), the bulbs were rotated to room B and point in positions $X^1(1,4)$, $Y^1(2,0)$, $Z^1(4,-1)$, later they carried out an

enlargement of the original bulb positions using a scale factor 3 from origin and fixed enlarged set up in Room C.

The bulbs from Room B were reflected in the line $y = -x$ and installed in Room D, and finally were guided to complete a lighting design showing rotation symmetry of order 3 about a central point O on the drawing plan.

Task

a) On a scale drawing, show the positions of planes A, B and C, three hours after they left Airport P and hence find the bearing of plane B from plane C using 1cm to represent 200km after 3 hours.

b) Find the centre and angle of rotation used to rotate bulb position from Room A to Room B.

c) Draw the bulbs' positions in each room and state the coordinates where necessary, hence complete the given diagram to show a rotational lighting pattern of order 3 about origin O.