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MATHEMATICS
Paper 1
Jul/Aug.2025
2 ¼ hours



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.

Item 1

After discovering the lack of cosmetics in Muuko town council, Miriam, a cosmetics producer won a bid of supplying the products, she arranged tins of beauty products on shop shelves based on their market value per unit as shown below;

The selling prices of tins are as follows:

SKINCARE	— 250,000
MAKEUP	— 200,000
HAIR CARE	— 150,000
FRAGRANCE	— 125,000

Each tin is produced at a fixed cost of Shs.100, 000. However, she anticipates a general percentage profit increase from the entire sale but is uncertain of the exact figure and seeks assistance.

To boost sales, she organized a promotion using 54 tins comprising two types, A and B. She instructed the marketing team to pack these tins in boxes maintaining a ratio of 5 tins of Type A to 4 tins of Type B. The team needs to establish the exact quantities of each type and the maximum number of full boxes they can prepare.

If sold without a discount, a box would fetch Shs.65, 000.

However, during the promotional campaign, Miriam offered a 20% discount per box. The sales personnel require help to determine the revised price per box.

Tasks:

Determine the;

- Percentage profit increase Miriam should expect from the entire stock on the shelves.
- Number of tins of Type A and Type B used for promotion, and hence the maximum number of full boxes that can be packed.
- Discounted price at which each promotional box will be sold.

Item 2

In Mango village, poverty was at its peak. Therefore a vibrant youth group launched a small-scale enterprise under the "Youth Boost Elevation Project (YBEP)", aimed at reducing unemployment and empowering rural youth through entrepreneurship.

They ventured into making and selling handmade bricks using local materials. During the first five weeks, they recorded the number of bricks sold and observed a consistent pattern in their weekly sales.

Week (x)	1	2	3	4	5
Bricks sold(y)	250	270	290	310	330

They noticed the pattern in sales and modelled future sales using the function:

$$y = -x^2 + 12x + 20$$

Their profit (in thousands of Uganda shillings) was modelled by the linear equation:

$$P = 500,000x + 20,000$$

Tasks

- a)
 - i) Find an expression for the nth term of the sequence.
 - ii) Use your expression to calculate how many bricks they would sell in week 10.
- b) Using a scale of 2 cm:1 unit on the x-axis and 1 cm:100 bricks on the y-axis, draw the graph of $y = -x^2 + 12x + 20$ and line $y = -2.5x + 65$ for which $0 \leq x \leq 12$.
 - i) Find the maximum number of bricks sold and the week this occurred.
 - ii) On the same graph, estimate the number of weeks for which;
 $85 + 14.5x - x^2 = 0$.
 - iii) Based on your findings assess whether the current model is sustainable.

SECTION B:

This Section has two Parts; I and II

Part I

Answer one item from this part

Item 3

In Namwendwa, vendors track and improve profitability while staying compliant with tax, food, and quality inspection policies.

Vendor activity has significantly increased, especially in the trade of cereal seeds such as maize, millet, sorghum, and simsim.

To regulate this booming activity and ensure hygiene and fair trade.

The district council introduced a market tax of UGX 1,500 per day per vendor.

A fixed daily lunch fee of UGX 2,000 was also established for all vendors.

Additionally, a quality inspection officer conducts daily random cereal inspections from each vendor to check seed purity and uphold market standards. Three regular vendors; Nabiryo, Mutesi, and Baguma, are known for consistent cereal seed trade.

The items sold are shown below:

Vendor	Maize(kg)	Millet(kg)	Sorghum(kg)	Simsim(kg)
Nabiryo	20	15	10	5
Mutesi	10	20	15	5
Baguma	15	5	10	10

Each cereal has a cost price per kg: Cereal Cost Price (UGX) Maize 1,200 Millet 1,500 Sorghum 1,000 Simsim 2,000	The vendors add different mark-ups (profit margins) per kg: Vendor Mark-up per kg (UGX) Nabiryo 300 Muteesa 400 Baguma 200
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Tasks

- Represent the quantities and cost price of cereals sold by each vendor as;
 - a 4×3 matrix A.
 - a 1×4 matrix B respectively.
- By use of matrix multiplication, compute the total;
 - Cost for each vendor, including Market tax and Feeding cost.
 - Expected sales revenue and net profit.
- Based on your findings, advice the Namwendwa community on how to stay compliant with taxes, food regulations and handle risks of inspection

Item 4

In a rural secondary school in Iganga district, a class teacher wanted to select a class captain from three candidates Andrew, Badul, and Cathy. He distributed voting slips to 116 students, instructing them to tick the name(s) of their preferred candidate(s). After collection, the teacher found that:

20 students ticked both A and C.

18 students ticked A and B.

9 students ticked only B and C.

42 students ticked B in total.

20 students ticked only C.

Those who ticked B only were half the number of those who ticked only A.

The number of students who ticked A and C but not B was equal to those who ticked none.

The teacher wishes to find out how many students supported each candidate and identify the most preferred candidate.

Tasks:

- Determine the number of students who ticked A and C respectively.
- Identify the candidate preferred by the majority.
- Assess whether the elected candidate is likely to lead the class easily, using percentages to support your reasoning.

PART II

Answer **one** item from this part

Item 5

Mukasa, a local carpenter in Kasese, specializes in making wall clocks from rhombus-shaped boards. A client placed an order for a circular wall clock with an area of at least 2826cm^2 . The board available is rhombus-shaped measuring 60cm, with slant sides meeting the base at angles of 60° and 120° , and its length and height known.

Mukasa wonders whether the largest possible circular clock can be cut from this board. If not, he must purchase a new one.

Mukasa employs two workers, each earning a gross salary of Shs.350, 000, which includes a total of Shs.70, 000 for meals and transport. Authorities have recently instructed that income tax must be deducted based on official tax bands.

Monthly taxable income(shs)	Tax rates (%)
0-100,000	0
100,001-200,000	5
Above 200,000	10

Tasks:

- Using a scale drawing, determine whether the board can accommodate a circular clock of the required area.
- Calculate the total income tax Mukasa is to remit to authorities for both employees.
- Determine the net income Mukasa will pay to each employee after tax.

Item 6

Kumi district executive personnel identified a gap in picking spare parts from Kampala to the area. It has therefore advertised in the newspapers.

Ms. Asio, a resident of Kumi Municipality, has taken up the initiative to operate a spare parts dealership with a capital of UGX 1 billion. As her business expands, she begins to explore advanced financial services to ensure sustainability and long-term growth. She decides to save part of her capital in a fixed deposit, insures her business and property, acquires land through a mortgage plan, and invests in a delivery van that appreciates in value. At the same time, she tracks her depreciating old machines and plans accordingly, projecting growth and understanding value changes over time.

Ms. Asio saves UGX 200 million in a fixed deposit account for 3 years at an annual compound interest rate of 9%, and takes UGX 400 million mortgage to purchase a warehouse. The mortgage has an annual interest rate of 6%, and she pays in equal annual instalments over 5 years.

She buys a delivery van at UGX 60 million. The van appreciates at 4% annually due to its limited edition status.

She owns a spare parts machine worth UGX 120 million, which depreciates at 15% per year.

Her insurance company charges 2.5% per annum on the insured value of UGX 900 million.

Tasks:

- a) Determine the amount at the end of 3 years and the interest earned.
- b) Establish the total amount payable and her annual mortgage instalment.
- c) Determine the value of the ;
 - i) van after 3 years and its increase in value
 - ii) Machinery after 4 years and the total loss in value after 4 years.
 - iii) Premium she pay annually and the total premium paid over 5 years?
- d) Justify the relevance of mortgage in the community.

END