

456/1

Mathematics

Paper 1

$2\frac{1}{4}$ hours



Apex Examination Council

MOCK EXAMINATIONS 2025

Uganda certificate of education

MATHEMATICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES;

This paper has two sections: A and B. it consists of **six** examination items. Section A has two compulsory items.

Section B has two parts (Part **I** and Part **II**). Choose **one** item from each part in Section B.

Answer a total of **four** items.

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 both items in this section.

Item I

Madam Namagembe bought three large cooking pots with capacities of 36 litres, 48 litres, and 60 litres respectively for her newly opened community kitchen. A land planner drew the site layout showing an area of 6.25 cm^2 on a map drawn to a scale of 1:200,000.

She later hired a new coordinator, who was told to convert the code 213_{five} to base ten in order to access the storage records. Upon inspection, the new coordinator also realised that only 3 out of every 5 of the 300 utensils had been labelled.

Tasks:

- (a) What is the largest possible volume, in litres, of a single jug that can be used to completely empty each pot without any remainder?
- (b) Calculate the actual area of the land in square kilometres.
- (c) Help the coordinator convert the code " 213_{five} " to base ten.
- (d) How many utensils still need to be labelled?

ITEM 2

Your colleague Lanyero is a member of STEMA TECH GROUP. After completing a short training on how to improve the efficiency and quality of production, she was given a compact machine to assist in her weekly operations. She planned to produce two types of electronic components: sensors and switches.

Her weekly production goals included the following:

She planned to produce at least 3 units of sensors

She did not want to produce more than 8 units of switches

She wanted to produce less than 12 units in total of both sensors and switches combined

She also aimed to produce more than three-quarters the number of sensors as switches

Tasks:

- (a) (i) Write down mathematical inequalities that represent the above conditions.
- (ii) Clearly draw and label the feasible region that satisfies all the inequalities on a Cartesian plane. Use sensors (x) on the horizontal axis and switches (y) on the vertical axis.
- (b) Determine the minimum total number of units she should produce in one week. State how many sensors and how many switches she should produce to achieve this minimum number.

SECTION B**Part I****Answer only one item from this part****Item 3**

At Bright Futures High School, a team of learners involved in co-curricular activities are part of various clubs. Among them:

40 are members of the Photography Club

20 take part in both the Photography and Debate Clubs

18 are involved in both Debate and Robotics Clubs

14 are engaged in Robotics and Photography Clubs only

4 students are not part of any club

A total of 44 students are involved in at least two of the three clubs

24 students are in only one club

22 students take part in either Robotics or Photography, but not Debate

The school management is considering setting up a shared activity room to support both Debate and Robotics Clubs, on condition that at least 60% of the students are involved in these two clubs.

Meanwhile, a training seminar has been scheduled for learners in Masindi, which is 240 km from Mityana. A truck carrying essential materials sets off from Mityana at 7:45 am, travelling at a steady speed of 40 km/h. Later, a van transporting the learners departs from the same place $1\frac{1}{2}$ hours after the truck, moving at a steady speed of 60 km/h.

Tasks:

(a) Should the school construct the shared activity room? Give a clear justification based on the data provided.

(b)

(i) Which vehicle arrives first in Masindi?

(ii) Calculate the difference in their arrival times.

Item 4

In an effort to improve the performance of precision tools used in student training, Kayunga Technical Works Ltd launched a quality review of their most frequently used equipment. Under the supervision of Mr. Waguwenda, a senior evaluator in the maintenance and standards department, a random sample of 50 tools was selected and tested to determine how long each could operate continuously without failure. The operation durations (in minutes), rounded to the nearest whole number, were as follows:

423 369 387 411 393 394 405 369 372 410
371 377 389 409 392 408 409 396 431 391
431 401 363 391 405 382 396 381 438 422
400 381 399 415 428 422 397 399 401 398
396 372 410 419 386 390 362 373 391 402

After reviewing the performance data, Mr. Waguwenda recommended that all tools with operation times equal to or less than the average value be withdrawn from active use.

Tasks

(a)

(i) Organize the data into class intervals of width 10 minutes and present it in a statistical frequency table. Analyze the trends and recommend the most appropriate strategy for withdrawing underperforming tools to Mr. Waguwenda.

(ii) Explain the reasoning behind your recommendation using the information presented in the table.

(b)

(i) Draw a suitable graphical representation frequency to help Mr. Waguwenda and his team visualize the distribution and use it to estimate the median operation time.

(iii) Interpret the graph and explain your findings using logical reasoning and appropriate figures.

Part II

Answer only one item from this part

Item 5

A pilot operating a private charter flight began his journey from Mbale (Uganda) to Juba (South Sudan), a distance of 370 km on a bearing of 305° . From Juba, the flight path was adjusted to Wau, located 430 km away on a bearing of 240° . The pilot then proceeded from Wau to Gulu (Uganda), flying 345 km on a bearing of 125° .

The pilot now plans to return directly from Gulu to Mbale using the shortest possible route and aims to complete this final leg of the journey in two hours.

Task:

Recommend the speed (in km/h) the pilot should maintain on the final leg of the journey to reach Mbale within the scheduled 2-hour timeframe.

Support your answer with accurate construction or calculations, and present a clearly reasoned conclusion for the pilot.

Item 6

Livingstone, a Mathematics teacher recently recruited by an education institution, has just been informed that his monthly income tax is UGX 1,102,000. He plans to purchase a used car valued at USD 8,900. He has two payment options:

Option 1: Pay the full amount in cash and receive a 5% discount

Option 2: Pay a deposit of UGX 10,000,000, then clear the balance in six equal monthly instalments of UGX 4,500,000

Livingstone is also unsure of how to determine his actual monthly take-home pay, as he needs to factor in PAYE (Pay As You Earn) deductions.

You may assume that the exchange rate is 1 USD = UGX 3,850

PAYE Taxation Schedule

Monthly taxable income	Tax rate
UGX 0 – 235,000	0%
UGX 235,001 – 335,000	10%
UGX 335,001 – 410,000	20%
UGX 410,001 and above	30%

Tasks

- Compare the two payment options Livingstone has for purchasing the car. Clearly show the financial difference between the two choices.
- Estimate Livingstone's monthly net pay after applying PAYE taxation.
- If Livingstone decides to save 60% of his monthly net pay, determine how many months it would take him to raise enough money to purchase the car in cash.

END