ISMAIL ALI

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MATHEMATICS
Paper 1
July/Aug. 2024
2¼ hours

SECONDARY SCHOOLS JOINT MOCK EXAMINATIONS, 2024

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 two examination items.*

Section **A** *has two compulsory items.*

Section **B** *has two parts;* **I** *and* **II**. *Answer one item in each part.*

Answer four examination items in all.

Any additional item(s) answered will not be scored.

All answers must be written on the answer sheets 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

In your weekly market, there is a trader who sells tomatoes. He packs his tomatoes on plates and in buckets before he sells them to his clients. A trader's plate holds 8 tomatoes and a bucket holds 8 plates. A trader has not been recording the number of complete buckets and plates he gets out his stock. A trader sells his plate of tomatoes at UGX 4000 and offers a 5% trade discount to a client who buys a bucket of tomatoes. The government charges a sales tax of 2% on every plate, a trader sells. In addition, a trader has records of the number of clients he received in previous three market days as 24, 36 and 72 respectively. However, a trader has not been getting time to assess the weekly progress of his business and has been looking for a helper to perform that duty on his behalf.

On a particular market day, the trader had stocked 240 tomatoes. The number of clients doubled the least number of clients he received in the previous three before that day.

Task

As a learner of mathematics,

(a) Help the trader to record the number of complete buckets he made out of his stock and the remaining number of plates that did not form a bucket on that market day.

(b) Prepare a written mathematical assessment of a trader's net income if he sold tomatoes packed:
   (i) On plates only.
   (i) In buckets only.

(c) Help the trader to come up with number of clients he received on that market day? Hence

Item 2

Your neighbor has a furniture company that produces two types of chairs; modern and classic chairs. Each modern chair requires 2 hours of woodwork and 4 hours of upholstery, while each classic chair requires one hour of woodwork and 3 hours of upholstery. The company has 100 hours of woodwork and 240 hours of upholstery available to have the work done perfectly. Each modern chair generates a profit of UGX 30,000 and each classic chair generates a profit of UGX 20,000. He has always maximized his total profit(P) after selling off all his chairs. At the end of his work, he usually makes x modern and y classic chairs.

(a) Write mathematical statements that show relationship between his modern and classic chairs.

(b) Show the feasible region of the relation on a Cartesian plane.

(c) Help your neighbor to determine the maximum profit he will get from the sale of all his chairs, as well as the number of chairs of each type he should make to maximize his profit.

SECTION B

This section has two parts; I and II

PART I

Answer only one item in this part.

Item 3

A group of 150 learners in your school sat for three examinations; English(E), Mathematics(M), and History(H). 60 passed English, 72 passed Mathematics, 70 passed History, 35 passed English and Mathematics, 32 passed English and History, and 20 learners passed all the three subjects. The number of learners who passed English only is equal to the number of learners who passed History only. Your school offers a half bursary to a learner who passes at least two subjects. There is a National Mathematics contest that requires participation of learners who passed Mathematics only, a project to trace the cultural lineage of some selected communities which requires participation of learners who passed mathematics and History only plus an external seminar in the neighbouring school that requires participation of learners who passed at most two subjects. The school has organized remedials for learners who failed all the examinations.

Task

(a) As a learner of mathematics, help the school to come up with;
  (i) The number of learners who will do remedial examinations.
  (ii) The percentage of learners who qualify for a half bursary.

(b) Is there any possibility of having participants in National Mathematics contest, a project to trace the cultural lineage of some selected communities and an external seminar? Give a reason(s) for your response.

Item 4

A company employs workers with varying ages. A manager of the company realized that the company employs workers who are teenagers, in the Middle Ages and in the old ages. A sample of 64 workers were asked to write down their age in years and the collected data was as follows;

17,	19,	24,	35,	24,	37,	28,	32
23,	22,	28,	39,	27,	42,	35,	28
27,	26,	34,	44,	32,	23,	39,	33
32,	33,	38,	25,	36,	26,	24,	34
36,	37,	43,	29,	41,	34,	27,	35
41,	42,	53,	31,	21,	38,	31,	31

46,	48,	21,	40,	29,	43,	40,	33
52,	55,	30,	45,	33,	25,	26,	25

The Ministry of Trade and Cooperatives is collecting data with the aim of obtaining the average and the most common age of workers employed in various companies and cooperatives in the country. The Ministry is further interested in the workers with 75% the age of the entire group of workers, such that they can be continuously trained in business management.

Task

As a learner of Mathematics,

(a) Help the Ministry achieve her aim, basing on the company's data above and state the significance of your help.

(b) Use the company's data above to determine the age of workers that will be on continuous training.

PART II

Answer only one item in this part.

Item 5

A farmer is fencing one side of his land that neighbors your home. He has fixed two posts; A and B, a distance apart at the extreme ends of the boundary. He wishes to create a pathway midway, M between the two posts, but he doesn't have a tape measure to find the exact position. In addition, he has two more posts; P and Q to fix in between posts A and B, with post P close post A and post Q close post B, such that they divide the fence into three equal parts. After fixing all the four posts, he realized that 20% of his land stretching from post A to post B, extends beyond post B. He then decides to fix post R beyond post B in the same straight line with already fixed posts, such that all his land is fenced. In order to beautify his fence, he has a plan to plant an equal number of red and yellow flowering plants in a regular pattern of red and yellow respectively in spaces between the posts.

Hint:

- All the fixed posts are defined from a farmer's house door, O.
- Post A is 3 meters East and 4 meters North of a farmer's door while post B is 6 meters East and 8 meters North of a farmer's door.
- Each flowering plant is planted at equal spacing of 10cm from one another along the line of the five posts.
- Each post between posts A and R, takes a space for 2 flowering plants and the pathway takes a space for 4 flowering plants.
- The positions of A and B from O, are written as a and b respectively.

Task:

As a learner of Mathematics, help the farmer

(i) to accurately create the pathway along the fence.

(ii) to generate mathematical relations of the positions of posts P, Q and R from O with a and b.

(iii) to understand the position where he fixed posts P, Q and R as determined from O.

(iv) to find out the number of flowering plants each type he should buy in order to beautify his fence.

Item 6

The Ministry of Education and Sports is planning to build three schools in your community. Three sites A, B and C were selected. A survey carried out by officials from the Ministry found site A at 30km west and 20km north of your District Headquarters, site B at 40km east and 50km north of your District Headquarters, and site C at 20 km east and 10km South of District Headquarters.

Before construction works begin, three straight roads AB, BC and CA connecting the three sites will be constructed. The lengths of the roads to be constructed are not determined yet. The cost of constructing a kilometer of a road is UGX 3 billion. These roads will make certain angles with each other. The area that will be enclosed by these roads will be left for large scale maize production.

Task:

As a learner of mathematics,

(a) Come up with a minimum budget the ministry should have in order to work on the construction of the three roads.

(b) Help the ministry;

(i) to find out the angles the roads will make with each other.

(ii) to determine the available space for large scale maize production.

Hint: all the results to calculations in involving decimals should be written to 1 decimal place.