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MATHEMATICS
   Paper 1
   2024
$2\frac{1}{4}$ hours

Uganda Certificate of Education
MATHEMATICS
Paper 1
2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

*This paper 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 sheets provided.*

Graph paper is provided.

Silent, non-programmable scientific calculators and mathematical tables with a list of

formula may be used.

SECTION A

Answer **all** items in this section.

Item 1 *(20 scores)*

Juma and John were enumerators in the recently concluded population census.

It takes Juma 10 days to count all the houses and people in your area while it takes John takes 15 days to dig the same piece of land. Assuming that both work at the same rate.

The recent population census revealed that Central region is most densely populated part of Uganda with a population of 14,000,000 people, 55% are females, 45% of the male population are employed and 25% of the females are employed.

Task:

(a)   What is the number of days they will both take do dig the same piece of land if they work together.

(b)   Find:

(i)   The male population in the country.

(ii) The female population unemployed.

(iii) The ratio of the male population employed to the female population employed.

(iv) Advise **URA** on how many people to give **TIN** numbers.

Item 2 *(20 scores)*

Your school soccer club coach wishes to intensively train its top and second division players by residential training in preparation for soccer league tournaments. The cost of maintaining a player is sh 60,000 and sh 45,000 per top and per second division player respectively. The club has a maximum of sh 1,800,000 for the residential training. One and a third times the number of top players must not exceed the number of second division players. Given that the club can only train up to 35 players who must be selected from the two divisions of players.

Task:

(a)   Write down the set of mathematical representing the relation between the two division players.

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

(c)   Help your school soccer coach find the maximum number of players from each division the club can train.

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

Item 3 *(20 scores)*

In a certain game a die and a coin are each thrown and tossed once respectively. One side of the coin is labelled T(tail) and the other H(head). The number which appears on the upper face of the die is the players' score. In addition, if a tail appears the player receives a score of 4, and a score of 6 when a head appears. The score obtained by tossing a coin is then divided by the score obtained by throwing a die. If this quotient is a prime number a player takes the first prize. A player takes the second prize if his quotient is a recurring decimal and a third prize if the quotient is a triangular number.

Task:

(a) Copy and complete the table below giving the possibility space of the game

Score on die	1	1									6	6
Score on coin	4	6										
Quotient	4	6										

(b) Find the probability that a player wins
  (i) The first prize
  (ii) The second prize
  (iii) The third prize
  (iv) None of the prizes given that there are only three prizes.

Item 4 *(20 scores)*

In a your school there are 87 students in S.3. Of these 43 play hockey, 42 play football and 47 play volleyball, 15 play hockey and volleyball, 17 play volleyball and football and 21 play hockey and football. Each student plays at least one of the three games.

Your parent deposited Shs 2.421 million on his savings account at the bank at a compound interest rate of 8.5% per annum with intention that it multiples to pay your university fees.

Task:

(a) How many students play all the three games

(b) If a student is chosen at random from the class, what is the probability that he plays exactly two games?

(c) Determine the number of years his money will take to accumulate to Shs 2.85 million.

Part II

Answer **one** item from this part

Item 5 *(20 scores)*

A plane flew due west from air strip A at a speed of 280 kmh^{-1} for ¾ hours before reaching air strip B. It then altered its course and flew North-west to airport C at 220kmh^{-1}. From there, it flew on a bearing of 060°to air strip D at 240 kmh^{-1} for $1\frac{1}{2}$ hours. The total time of flight between the four air strips was $4\frac{1}{2}$ hours.

Task:

(a) Determine the distance and bearing of A from D.

(b) Determine the total distance of flight from A to D and hence the average speed for the journey.

(c) If the plane flew directly back to A at a speed of 200kmh^{-1}, determine how long it takes to fly back to A.

Item 6 *(20 scores)*
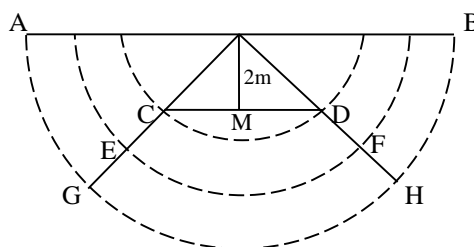
Your school has organised a mathematics seminar, the high table CD which is 3m long is used by guest speakers. The table is placed in front of and parallel to wall AB. Some chairs are arranged behind the high table with the front legs of each chair occupying 0.5m along CD. Participants are seated on chairs arranged in circular form placed in front of the high table along the arcs EF, GF, and IJ of circles whose centers are the point O along   AB as shown in the diagram above. The chairs are also arranged such that each occupies 0.5 m of the length along the arcs. Given that the perpendicular line from O bisects CD at point M and CE = EG = GI = 2M

Task:

(a) Find the angle COD

(b) The maximum number of guest speakers that can get seated at the seminar.

(c) The maximum number of participants that can get seated in chairs arranged along the arcs. (correct your answers (number of people to the nearest whole number)

END