Data and Probability

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Item 3 & 4

- Data collection/display and presentation
- Graphs
- Set theory
- Matrices
- Probability

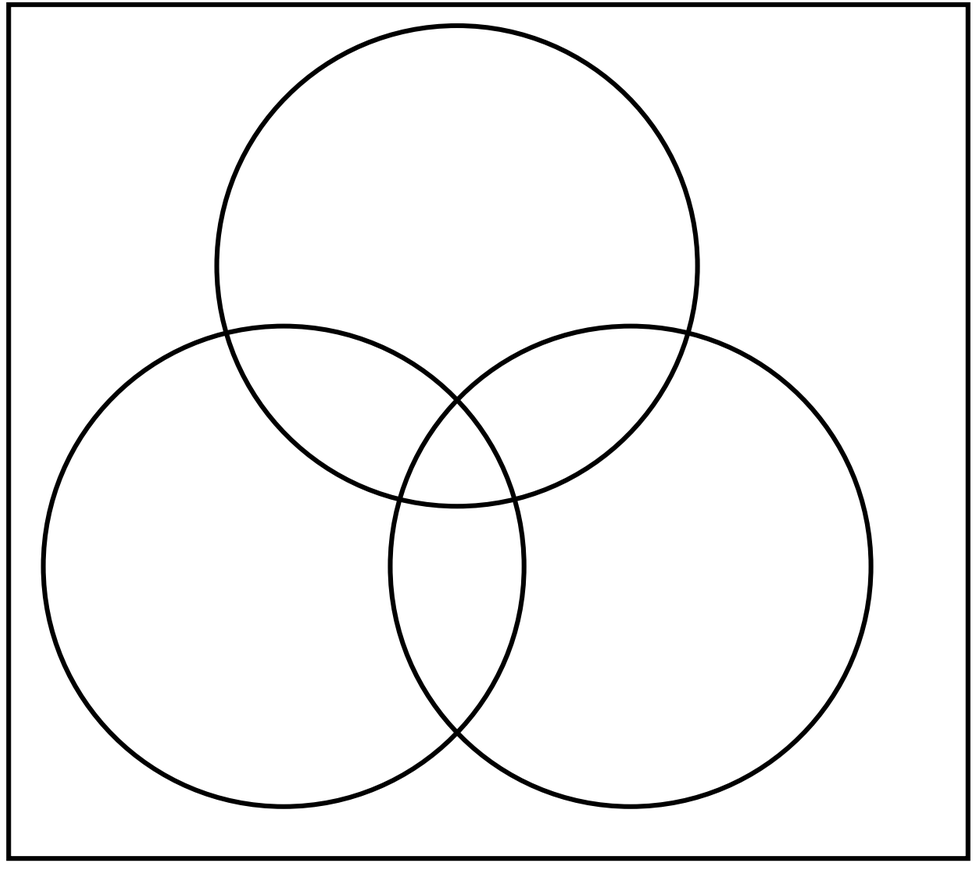
DOS

- Summarize your data and define all the variables used e.g.
- Use a pair of compasses to draw the circles
- Have a rectangle representing the universal set
- Have a conclusion in words
- Start with the 3 intersection region
- For probabilities write to at least 2dps

DON'TS

- Never use a free hand to draw your diagrams
- Don't calculate directly ,show your working
- Never use undefined variables

Set theory



Activity 1

- In S.4 class of 50 students, 24 Like football, 21 like basketball and 18 like chess, 6 like football and basketball only, 3 Like basketball only, 5 like all three games and 14 did not like any of the three games.

a) Illustrate the information on a Venn diagram.

b) find the number of students who like:

(i) Football and chess only

ii) exactly one of the games.

(iii) at least two of the games

ACTIVITY 2

Juliana goes to the local leisure centre. She records that 50 people visit that day. Of those that visit,

- 30 visited the gym
- 13 people went swimming
- 22 people went to the spa
- 6 people went swimming and went to the spa
- 11 people went to the spa and visited the gym
- 12 people went swimming and visited the gym
- 5 people went swimming, visited the gym and went to the spa

Tasks

a) Draw a Venn diagram to display this information.

b) How many people visited the leisure centre but did not visit any of the gym, spar or swimming pool?

c) One person is picked out. What is the probability that they visited the gym and went swimming?

ACTIVITY 3

The senior two class of 2024 has covered 3 topics in a subject. Their teacher decided to assess them by setting an item about each of the 3 topics. 4 students failed all the 3 items. 6 passed item 1 only. 10 passed item 2 only. 8 passed item1 and item 3 only. Those who passed item 2 and item 3 only were 30. 10 passed all the three items. Those who passed item 1 and item 2 only were three times those who passed item 3 only. A total of 100 students sat for the assessment.

TASK:

a) Help the teacher to organize this information for easy interpretation.

b) Find how many students passed;

i) 1 item only

ii)each item

c) Using data values, which of the 3 items should the teacher prepare to have extra discussions with the students.

ACTIVITY 4

A college is considering offering grants to students involved in sports activities, with the criteria that more than 70% of the applicants must participate in at least one of the sports: Volleyball (V), Tennis (T), or Badminton (B), and more than 50% must be proficient in at least two of these three sports. The college receives applications from 150 students, revealing that 65 students play Volleyball, 70 play Tennis, and 80 play Badminton. Additionally, 30 students play both Volleyball and Tennis, 25 play both Volleyball and Badminton, and 35 play both Tennis and Badminton, while 23 students did not participate in any of the three sports.

Tasks:

a) Using the information given, determine whether the college should offer the grants based on the criteria that more than 80% of the students must participate in at least one sport, and more than 50% must be proficient in at least two sports.

b) Calculate the probability that a randomly selected student from the group participates in only one of the sports (Volleyball, Tennis, or Badminton).

ACTIVITY 5

In the bid to determine the likelihood of a particular cell phone being successful on the market, your uncle who owns an electronics workshop tasked you to conduct a survey on 150 people on the streets of your town about the usage of any of these cell phones. Galaxy (G), Flip phone (F), and I-phone (I), then he will decide whether to purchase more of a given type if the likelihood of those who used only that one type exceeds 0.1.

45 owned a flip phone, 60 owned an I-phone, 63 owned a Galaxy, 15 owned a Flip phone and an I-phone, 25 have owned both a Galaxy and an I-phone, 15 have owned both a Galaxy and a Flip phone only and 5 have owned all the three.

Task:

(a) Find out if there are people who have not owned any of the three.

(b) Calculate the probability of people who owned only one type of each cell phone.

(c) Advise your uncle on whether to purchase more of these types

ACTIVITY 6

A gym is thinking about adding more cardio equipment for its members. The gym manager surveyed a sample of 60 members and asked which equipment they used in the previous month. He considered three types of equipment, treadmills (T), stair masters (S) and dumb bells (D). The manager would therefore come up with a decision to purchase more equipment if the chance of a member who prefers only one equipment exceeds 0.10. 15 members used treadmills, 30 used stair masters, 19 used dumb bells, 8 used tread mills and stair masters, 12 used tread mills and dumb bells, 7 used stair masters and dumb bells while 5 used all the three equipment.

- Task:
- (a) Determine the number of members that did not use any of the equipment.
- (b) Calculate the probability of a member chosen at random used at least one of the three equipment.
- (c) Advise the manager with a reason based on calculation, whether to come up with decision on which equipment would be purchased more.

ACTIVITY 7

Your uncle is an agricultural officer and has advised farmers in the village to grow some other crops to boost their income. These food crops include melons, cassava and pumpkins because they are bought at higher prices. In the next planting season, 120 farmers decided to grow at least one of the crops.

62 farmers decided to plant pumpkins, 83 planted melons and 60 planted cassava. 20 planted pumpkins and cassava, 30 planted pumpkins and melons while 40 decided to plant melons and cassava. 18 families planted melons only. The officer wants to order for pesticides that will be used when in need and to get for them a collective market so that they will gain more from their harvest so he needs to summarize the data.

Task

(a) As a Mathematics student, help your uncle to summarize the data using a suitable drawing.

(b) If a farmer is to be selected at random from the village, what is the chance that he will need pesticides for at least two crops?

ACTIVITY 8

A market survey of 200 sellers revealed that 110 sellers trade in vegetables, 130 sellers trade in fruits, and 90 sellers trade in grains. It was also noted that some sellers trade in more than one type of produce: 50 sellers trade in both vegetables and fruits, 40 sell both fruits and grains, and 30 sell both grains and vegetables.

Task:

(a) Determine the number of sellers who trade in exactly two types of produce.

(b) Is it possible that some sellers did not trade in any of the types of produce? Justify your response.

(c) Based on your calculations, provide recommendations to sellers trading only one type of produce.

ACTIVITY 9

For your leaver's party campaign, members suggested that you buy and put on T-shirts as a class. You have three suggestions of sizes of T-shirts you can buy these are; Small size(S), Medium size (M) and Large size (L) T-shirts.

You will only buy the suggestion as the captain if 70% of your fellow students can fit in at least two sizes. Below are your findings that you are going to base on to make a decision:

- The number of students who fit in medium size is equal to those who fit in large size and they are 100.
- The number of students who fit in small size is 76.
- Those who fit in small size and large size are 50.
- Those who fit in medium size and large size are 70.
- Those who fit in small size and medium size are 60.
- Those who fit in none of the sizes are 4.
- Some students fit in all the three sizes.
- The class is made up of 140 students.

Task:

a) Will you buy the suggestion of buying and putting on T-shirts as a class for your leaver's party campaign? Justify your answer.

ACTIVITY 10

In a school survey, 260 students were asked about their internet usage habits. They were asked to choose from three activities: Social Media (like Facebook and TikTok), Academic Work (such as research and homework), and Playing Games. The results showed that 165 students use the internet for Social Media, 130 use it for Academic Work, and 100 use it for Playing Games. Among them, 70 students use it for both Social Media and Academic Work only, 60 use it for both Social Media and Playing Games, and 50 use it for both Playing Games and Academic Work. Additionally, no students exclusively use the internet for playing games. Now, the school needs to decide whether to set rules if more than 60% of students spend their internet time on Social Media.

Task:

a) Calculate how many students use the internet for at least one of these activities.

b) Determine how many students don't use the internet at all.

c) Estimate the percentage of students who use the internet solely for Academic Work.

d) Based on the Findings, advise the school on whether to implement rules or not.