

Unit 3a Homeowrk

Homework 1 – Due Tuesday, October 31

**Show work on separate sheets of paper!*

Topics: Set Theory, Venn Diagrams, Probability

1. In a college 450 students were surveyed with the following results

*150 have a television
205 have a computer
220 have an iPhone
75 have an iPhone and a computer
60 have a television and a computer
70 have a television and an iPhone
40 have all three.*

- (a) Draw a Venn diagram to show this information. Use T to represent the set of students who have a television, C the set of students who have a computer and I the set of students who have an iPhone. *[4 marks]*
- (b) Write down the number of students that
- (i) have a computer only;
 - (ii) have an iPhone and a computer but no television. *[2 marks]*
- (c) Write down $n[T \cap (C \cup I)']$. *[1 mark]*
- (d) Calculate the number of students who have none of the three. *[2 marks]*

Two students are chosen at random from the 450 students. Calculate the probability that

- (e) (i) neither student has an iPhone;
- (ii) only one of the students has an iPhone. *[6 marks]*

2.

100 students at IB College were asked whether they study Music (M), Chemistry (C), or Economics (E) with the following results.

10 study all three
15 study Music and Chemistry
17 study Music and Economics
12 study Chemistry and Economics
11 study Music **only**
6 study Chemistry **only**

(a) Draw a Venn diagram to represent the information above. *[4 marks]*

(b) Write down the number of students who study Music but not Economics. *[1 mark]*

There are 22 Economics students **in total**.

(c) (i) Calculate the number of students who study Economics only.

(ii) Find the number of students who study none of these three subjects. *[4 marks]*

A student is chosen at random from the 100 that were asked above.

(d) Find the probability that this student

(i) studies Economics;

(ii) studies Music and Chemistry but not Economics;

(iii) does not study either Music or Economics;

(iv) does not study Music given that the student does not study Economics. *[7 marks]*

3. Beartown has three local newspapers: *The Art Journal*, *The Beartown News*, and *The Currier*.

A survey shows that

32 % of the town's population read *The Art Journal*,
46 % read *The Beartown News*,
54 % read *The Currier*,
3 % read *The Art Journal* and *The Beartown News* **only**,
8 % read *The Art Journal* and *The Currier* **only**,
12 % read *The Beartown News* and *The Currier* **only**, and
5 % of the population reads **all** three newspapers.

- (a) Draw a Venn diagram to represent this information. Label A the set that represents *The Art Journal* readers, B the set that represents *The Beartown News* readers, and C the set that represents *The Currier* readers. [4 marks]
- (b) Find the percentage of the population that does not read any of the three newspapers. [2 marks]
- (c) Find the percentage of the population that reads exactly one newspaper. [2 marks]
- (d) Find the percentage of the population that reads *The Art Journal* or *The Beartown News* but not *The Currier*. [2 marks]

A local radio station states that 83 % of the population reads either *The Beartown News* or *The Currier*.

- (e) Use your Venn diagram to decide whether the statement is true. Justify your answer. [2 marks]

The population of Beartown is 120 000. The local radio station claimed that 34 000 of the town's citizens read at least two of the local newspapers.

- (f) Find the percentage error in this claim. [4 marks]

Homework 2 – Due Thursday, November 2

**Show work on separate sheets of paper!*

Topics: Probability, Tree Diagrams

1. Leanne goes fishing at her favourite pond. The pond contains four different types of fish: bream, flathead, whiting and salmon. The fish are either undersized or normal. This information is shown in the table below.

Size / Type of fish	Bream	Flathead	Whiting	Salmon	Total
Undersized	3	12	18	9	42
Normal	0	11	24	13	48
Total	3	23	42	22	

- (a) Write down the total number of fish in the pond.

[1 mark]

Leanne catches a fish.

- (b) Find the probability that she
- (i) catches an undersized bream;
 - (ii) catches either a flathead or an undersized fish or both;
 - (iii) does **not** catch an undersized whiting;
 - (iv) catches a whiting given that the fish was normal.

[7 marks]

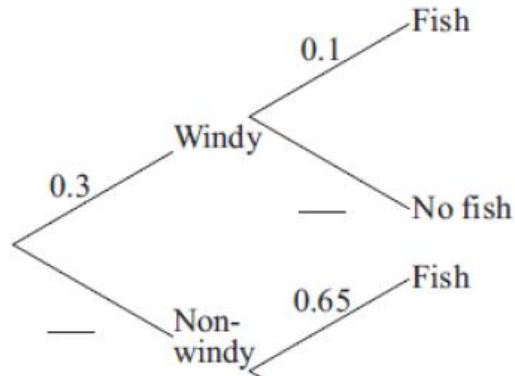
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(Question 1 continued)

Leanne notices that on windy days, the probability she catches a fish is 0.1 while on non-windy days the probability she catches a fish is 0.65. The probability that it will be windy on a particular day is 0.3.

(c) Copy and complete the probability tree diagram below.

[3 marks]



(d) Calculate the probability that it is windy and Leanne catches a fish on a particular day.

[2 marks]

(e) Calculate the probability that Leanne catches a fish on a particular day.

[3 marks]

(f) Use your answer to part (e) to calculate the probability that Leanne catches a fish on two consecutive days.

[2 marks]

(g) Given that Leanne catches a fish on a particular day, calculate the probability that the day was windy.

[3 marks]