

S1 Probability Challenge

Challenge 1

Keith, Yasmin and Suzie are friends who often go to a jazz club on a Friday night. The probability that Keith goes to the club on a particular Friday is 0.7 and is independent of whether or not Yasmin and Suzie go.

The probability that Yasmin goes to the club is 0.8 if Keith goes and 0.6 if Keith does not go.

The probability that Suzie goes to the club:
is 0.9 if both Keith and Yasmin go;
is 0.65 if Keith goes but Yasmin does not;
is 0.55 if Yasmin goes but Keith does not;
is 0.4 if neither Keith nor Yasmin go.

By drawing a tree diagram, or otherwise, find the probability that on a particular Friday:

- (a) all three friends go to the club; *(3 marks)*
- (b) Keith goes to the club but Yasmin and Suzie do not; *(2 marks)*
- (c) Yasmin and Suzie go to the club but Keith does not; *(2 marks)*
- (d) Suzie goes to the club. *(3 marks)*



Challenge 2

A rugby club has three categories of membership: adult, social and junior. The number of members in each category, classified by gender, is shown in the table below.

	Adult	Social	Junior
Female	25	35	40
Male	95	25	80

One member is chosen, at random, to cut the ribbon at the opening of the new clubhouse.

(a) Find the probability that:

- (i) a female member is chosen;
- (ii) a junior member is chosen;
- (iii) a junior member is chosen, given that a female member is chosen. *(4 marks)*

(b) V denotes the event that a female member is chosen.
 W denotes the event that an adult member is chosen.
 X denotes the event that a junior member is chosen.

For the events V , W and X :

- (i) write down two which are mutually exclusive; *(1 mark)*
- (ii) find two which are neither mutually exclusive nor independent. Justify your answer. *(3 marks)*



Challenge 3

A random sample of 170 students aged between 16 and 21 years was asked their opinions regarding the level of the student loan available to students in higher education.

They were asked to comment on whether they felt the level of the loan was too low, about right or too high.

The following table summarises their replies.

Age of student \ Reply	Too low	About right	Too high
16 – 17 years	45	17	8
18 – 21 years	40	35	25

A student is chosen at random.

B is the event “the student is aged 16 – 17 years”.

C is the event “the student replied about right”.

D is the event “the student replied too high”.

(a) Find:

(i) $P(C)$; (2 marks)

(ii) $P(B \cap D)$; (1 mark)

(iii) $P(C \cup B)$; (2 marks)

(iv) $P(D \mid B)$. (3 marks)

(b) Define in words the event $B \cup D$. (2 marks)



Final Challenge

The following shows the results of a survey on the types of exercise taken by a group of 100 people.

65 run
48 swim
60 cycle
40 run and swim
30 swim and cycle
35 run and cycle
25 do all three

(a) Draw a Venn Diagram to represent these data.

(4)

Find the probability that a randomly selected person from the survey

(b) takes none of these types of exercise,

(2)

(c) swims but does not run,

(2)

(d) takes at least two of these types of exercise.

(2)

Jason is one of the above group.

Given that Jason runs,

(e) find the probability that he swims but does not cycle.

(3)

