

Venn Diagrams and Conditional Probability

Starter

1. In a group of 16 students, 12 take art and 8 take music. One student takes neither art nor music.
 - (a) Draw a Venn diagram to help you find the number of students who take both art and music.
 - (b) A student is selected at random. Find the probability the student takes art but not music.
 - (c) A **music** student is chosen at random. Find the probability that they do not study art.
 - (d) An **art** student is chosen at random. Find the probability that they also study music.

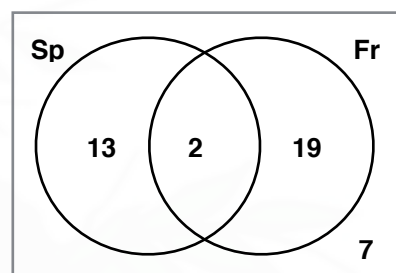
Notes

In questions, the words “if” and “given” are often used to introduce a condition that tells us to ignore part of the Venn diagram.

Work on this part first as this gives us the numbers to add together to get the denominator.

The numerator comes from one of the numbers that add together to get the denominator.

E.g. 1 The Venn diagram shows the number of students studying Spanish and French at a school.



- (a) A student is chosen at random. Find the probability he/she studies French.
- (b) A student is chosen at random. Find the probability he/she does not study Spanish.
- (c) A French student is chosen at random. Find the probability he/she studies Spanish.
- (d) A Spanish student is chosen at random. Find the probability he/she does not study French.

Working: (a) “A student is chosen at random.” \equiv all students considered (41)

$$P(\text{studies French}) = \frac{2 + 19}{13 + 2 + 19 + 7} = \frac{21}{41}$$

(b)

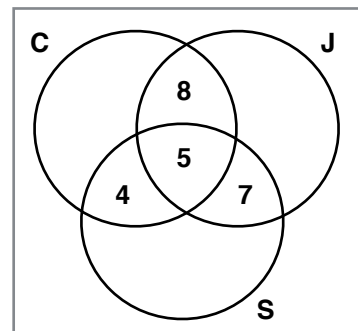
(c) “A French student is chosen at random.” \equiv only F is considered
 Total French students = $2 + 19 = 21$
 Also study Spanish = 2

$$P(\text{studies Spanish given study French}) = \frac{2}{2 + 19} = \frac{2}{21}$$

(d)

E.g 2* There are 120 students in a school. 40 study Chinese (C), 35 study Japanese (J), and 30 study Spanish (S).

- (a) Complete the Venn diagram by filling in the numbers in the missing spaces, including outside the circles.
- (b) A student is chosen at random. Find the probability that they:
- (i) study Chinese, Japanese and Spanish
 - (ii) Chinese and Japanese
 - (iii) Spanish and Japanese but not Chinese
 - (iv) study Japanese given that they study Chinese.



Video: [Venn diagrams](#)

[Solutions to Starter and E.g.s](#)

Exercise

Worksheet **Solving problems using Venn diagrams** Qu 4-11

9-1 class textbook: p246 M8.7 Qu 1-6 (Look at Qu 2 and 5 in class)

A*-G class textbook: No exercise

9-1 homework book: p84 M8.7 Qu 1-5

A*-G homework book: No exercise

Summary

“If” and “given” are often used to introduce a condition that tells us to ignore part of the Venn diagram.

Solving problems using Venn diagrams SOLUTIONS

[Homework book answers \(only available during a lockdown\)](#)