

Prob with conditional

53 min
52 marks

1. (a) List the elements of the set $A = \{x \mid -4 \leq x \leq 2, x \text{ is an integer}\}$. (1)

A number is chosen at random from set A .

Write down the probability that the number chosen is

- (b) a negative integer; (2)

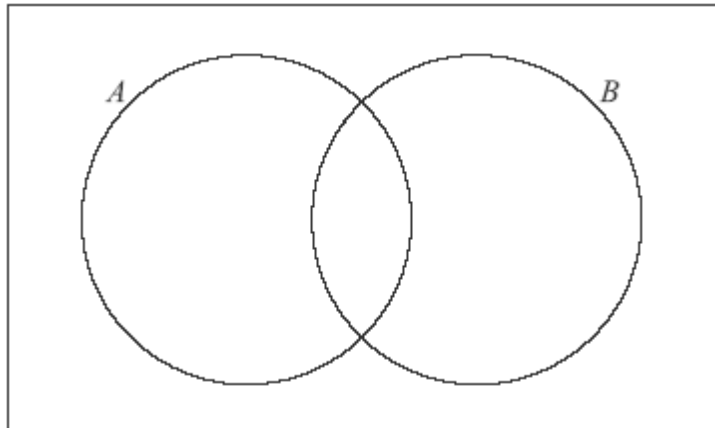
- (c) a positive even integer; (1)

- (d) an odd integer less than -1 . (2)
- (Total 6 marks)

2. A group of 30 students were asked about their favourite topping for toast.

18 liked peanut butter (A)
10 liked jam (B)
6 liked neither

- (a) Show this information on the Venn diagram below.



(2)

- (b) Find the number of students who like both peanut butter and jam.

(2)

- (c) Find the probability that a randomly chosen student from the group likes peanut butter, given that they like jam.

(2)

(Total 6 marks)

3. A **weighted** die has 2 red faces, 3 green faces and 1 black face. When the die is thrown, the black face is three times as likely to appear on top as one of the other five faces. The other five faces have equal probability of appearing on top.

The following table gives the probabilities.

Red 1	Red 2	Green 1	Green 2	Green 3	Black
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{m}{8}$	$\frac{1}{8}$	$\frac{n}{8}$

- (a) Find the value of

(i) m ;

(ii) n .

(2)

The die is thrown once.

- (b) Given that the face on top is not red, find the probability that it is black. (2)

The die is now thrown twice.

- (c) Calculate the probability that black appears on top both times. (2)
(Total 6 marks)

4. Let $P(A) = 0.5$, $P(B) = 0.6$ and $P(A \cup B) = 0.8$.

- (a) Find $P(A \cap B)$. (2)

- (b) Find $P(A | B)$. (2)

- (c) Decide whether A and B are independent events. Give a reason for your answer. (2)
(Total 6 marks)

5. A class consists of students studying Spanish or French or both. Fifteen students study Spanish and twelve study French.

The probability that a student studies French given that she studies Spanish is $\frac{7}{15}$.

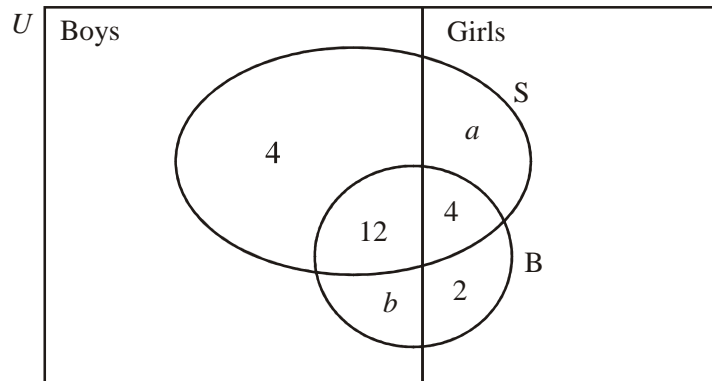
- (a) Draw a Venn diagram to illustrate this information. (3)

- (b) Find the probability that a student studies Spanish given that she studies one language only. (3)
(Total 6 marks)

6. Children in a class of 30 students are asked whether they can swim (S) or ride a bicycle (B).

There are 12 girls in the class. 8 girls can swim, 6 girls can ride a bicycle and 4 girls can do both.

16 boys can swim, 13 boys can ride a bicycle and 12 boys can do both. This information is represented in a Venn diagram.



- (a) Find the values of a and b . (2)
- (b) Calculate the number of students who can do neither. (2)
- (c) Write down the probability that a student chosen at random can swim. (2)
- (d) Given that the student can ride a bicycle, write down the probability that the student is a girl. (2)
- (Total 8 marks)

7. A school jazz band contains three different musical instruments — saxophone (S), clarinet (C) and drums (D). Students in the band are able to play one, two or three different instruments. In a class of 40 IB students, 25 belong to the jazz band. Out of these 25

3 can play all three instruments
 5 can play the saxophone and clarinet **only**
 5 can play **at least** the clarinet and drums
 7 can play **at least** the saxophone and drums
 16 can play the saxophone
 12 can play the clarinet.

- (a) Draw a Venn Diagram and clearly indicate the numbers in each region. (5)

- (b) Show that the number of students who play the drums **only** is 5. (2)
- (c) Find the probability that a student chosen at random from the IB class plays only the saxophone. (2)
- (d) Find the probability that a student chosen at random from the IB class plays either the clarinet or drums or both. (2)
- (e) Given that a student plays the saxophone, find the probability that he also plays the clarinet. (3)

(Total 14 marks)