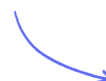


Conditional Probability

Conditional Probability / Combined Conditional Probabilities

Medium (6 questions)	/16
Hard (7 questions)	/29
Very Hard (3 questions)	/20
Total Marks	/65

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Medium Questions

1 A group of 200 people were asked which city they would like to visit next. The table shows the results.

City	London	Paris	New York	Tokyo
Number of people	50	48	56	46

Two people are chosen at random from the group of 200.
Find the probability that one person would like to visit London next and the other person would like to visit New York next.
Give your answer as a percentage.

..... %

(3 marks)

2 A box contains 7 black pens and 8 orange pens. Two pens are chosen at random from this box without replacement. Calculate the probability that at least one orange pen is chosen.

(3 marks)

3 A box contains 15 red pencils, 8 yellow pencils and 2 green pencils.
Two pencils are picked at random without replacement.
Find the probability that at least one pencil is red.

(3 marks)

- 4 The speed, v km/h, of each of 200 cars passing a building is measured.
The table shows the results.

Speed (v km/h)	$0 < v \leq 20$	$20 < v \leq 40$	$40 < v \leq 45$	$45 < v \leq 50$	$50 < v \leq 60$	$60 < v \leq 80$
Frequency	16	34	62	58	26	4

Two of the 200 cars are chosen at random.
Find the probability that they both have a speed greater than 50 km/h.

(2 marks)

- 5 Ravi has a bag which contains 10 red balls and 8 blue balls.
Ravi takes two balls at random from his bag, without replacement.
Find the probability that one ball is red and one ball is blue.

(3 marks)

- 6 A box contains 20 packets of potato chips. 6 packets contain barbecue flavoured chips.
10 packets contain salt flavoured chips. 4 packets contain chicken flavoured chips.
Maria takes two packets at random **without replacement**.

Show that the probability that she takes two packets of salt flavoured chips is $\frac{9}{38}$.

(2 marks)

Hard Questions

- 1 Sonia has a bag containing 20 sweets. In the bag, there are 5 red, 6 green and 9 yellow sweets. Sonia chooses two sweets at random, without replacement, from the bag.

i) Show that the probability that she chooses two green sweets is $\frac{3}{38}$.

[2]

ii) Calculate the probability that the sweets she chooses are **not** both the same colour.

[4]

(6 marks)

- 2 The heights, h metres, of the 120 boys in an athletics club are recorded. The table shows information about the heights of the boys.

Height (h metres)	$1.3 < h \leq 1.4$	$1.4 < h \leq 1.5$	$1.5 < h \leq 1.6$	$1.6 < h \leq 1.7$	$1.7 < h \leq 1.8$	$1.8 < h \leq 1.9$
Frequency	7	18	30	24	27	14

Three boys are chosen at random from the club.
Calculate the probability that one of the boys has a height greater than 1.8 m and the other two boys each have a height of 1.4 m or less.

(4 marks)

- 3 200 students estimate the total area, $A \text{ m}^2$, of the windows in the classroom.
The table shows their results.

Area ($A \text{ m}^2$)	$20 < A \leq 60$	$60 < A \leq 100$	$100 < A \leq 150$	$150 < A \leq 250$
Frequency	32	64	80	24

Two students are chosen at random from those students that estimated the area of the windows to be more than 100 m^2 .

Find the probability that one of the two students estimates the area to be greater than 150 m^2 and the other student estimates the area to be 150 m^2 or less.

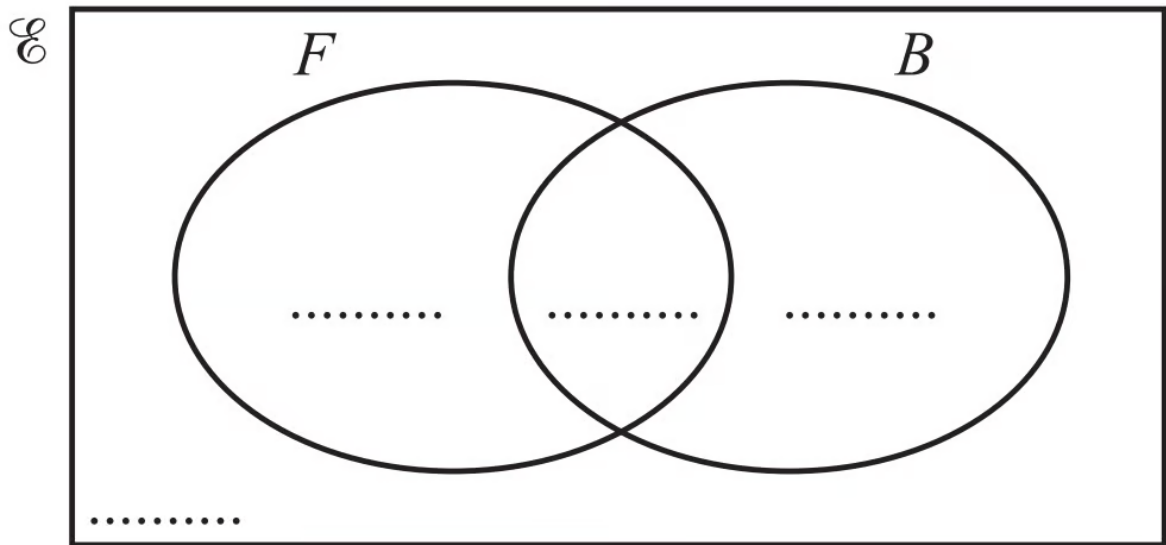
(3 marks)

- 4 (a) $\mathcal{E} = \{\text{students in a school}\}$
 $F = \{\text{students who play football}\}$
 $B = \{\text{students who play baseball}\}$

There are 240 students in the school.

- 120 students play football
- 40 students play baseball
- 90 students play football but not baseball.

Complete the Venn diagram to show this information.



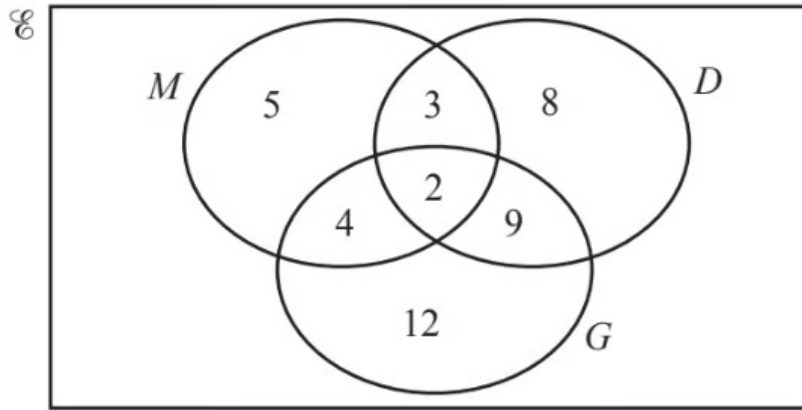
(2 marks)

- (b) Two students who play baseball are chosen at random.
Find the probability that they both also play football.

(3 marks)

- 5 Talika has a bag which contains 10 red balls and 8 blue balls. Talika takes three balls at random from her bag, without replacement.
Calculate the probability that the three balls are the same colour.

(4 marks)



The Venn diagram above shows information about the number of students who study Music (M), Drama (D) and Geography (G).

Two students are chosen at random from those who study Drama.
Calculate the probability that they both also study Music.

(3 marks)

- 7 A box contains 20 packets of potato chips. 6 packets contain barbecue flavoured chips.
10 packets contain salt flavoured chips.
4 packets contain chicken flavoured chips.
Maria takes two packets at random **without replacement**.

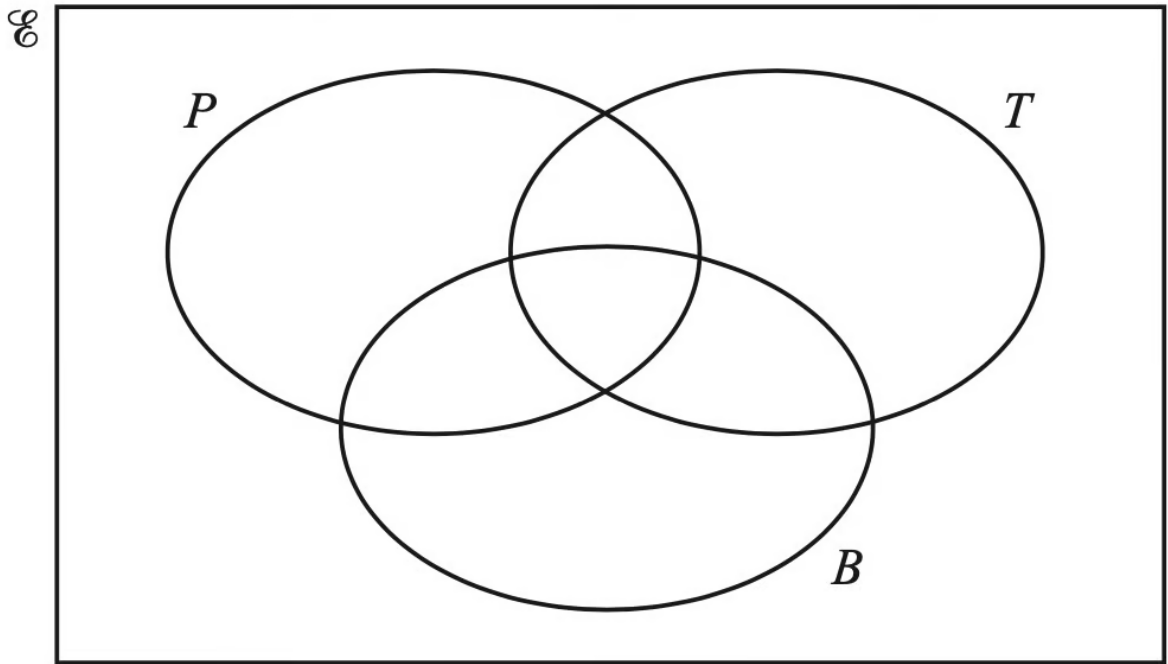
Find the probability that she takes two packets of different flavoured chips.

(4 marks)

Very Hard Questions

- 1 (a) This year, 40 students have each travelled by one or more of plane (P), train (T) or boat (B).
7 have travelled only by plane.
11 have travelled only by train.
9 have travelled only by boat.

$$n(P \cap T) = 8 \quad n(B \cap T) = 3 \quad n(B \cap P) = 6$$



Complete the Venn diagram.

(3 marks)

- (b) Two students are chosen at random.
Calculate the probability that they both have travelled only by plane.

(2 marks)

- (c) Two students are chosen at random from those who have travelled by train.
Calculate the probability that they both have also travelled by plane.

(2 marks)

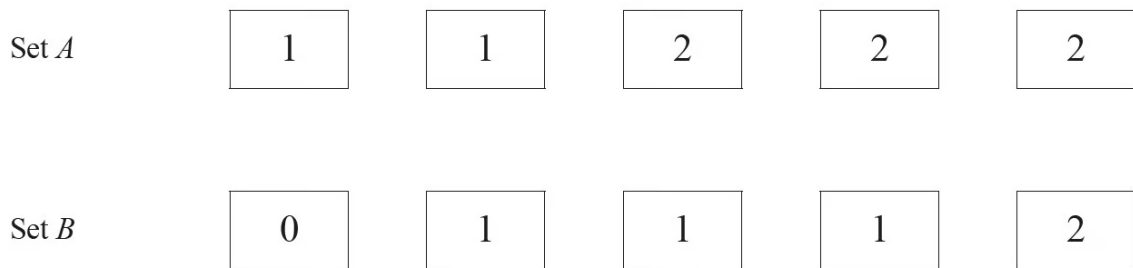
- 2 A box contains 20 packets of potato chips.
6 packets contain barbecue flavoured chips.
10 packets contain salt flavoured chips.
4 packets contain chicken flavoured chips.

Maria takes three packets at random, **without replacement**, from the 20 packets.

Find the probability that she takes **at least two** packets of chicken flavoured chips.

(3 marks)

- 3 (a) The diagram shows two sets of cards.



- i) Jojo chooses two cards at random from Set A without replacement.
Find the probability that the two cards have the same number.

[3]

- ii) Jojo replaces the two cards. Kylie then chooses one card at random from Set A and one card at random from Set B.
Find the probability that the two cards have the same number.

[3]

- iii) Who is the most likely to choose two cards that have the same number? Show all your working.

[1]

(7 marks)

(b)

Set C

4

4

5

5

5

Lena chooses three cards at random from Set C without replacement. Find the probability that the third card chosen is numbered 4.

(3 marks)