Conditional Probability

1.

64 students received either a grade A, B or C in a Chemistry test.
Find the probability that a randomly chosen student was male given the student got a grade A.

	A	B	C	Total
Male	17	5	8	30
Female	18	4	12	34
Total	35	9	20	64

2.

The results of a survey of holiday destinations for 54 children are given in the table below.
Find the probability that a randomly chosen child went to Italy given the child was male.

	Belgium	Spain	Italy	Total
Male	6	13	12	31
Female	5	15	3	23
Total	11	28	15	54

3.

The results of a survey of favourite subjects for 68 children are given in the following table. Complete the table, then answer the question below.

	Chemistry	Physics	History	Total
Male	20			46
Female		3		22
Total	30	22		68

Find the probability that a randomly chosen child was male given the child liked Physics.

4.

The two-way table shows the number of deaths and serious injuries caused by road traffic accidents in Great Britain in 2013.

		Speed limit			
		20 mph	30 mph	40 mph	Total
Type of injury	Fatal	6	520	155	681
	Serious	420	11 582	1662	13 664
	Total	426	12 102	1817	14 345

Work out an estimate for the probability

a that the accident is fatal given that the speed limit is 30 mph

b that the accident happens at 20 mph given that the accident is serious

c that the accident is serious given that the speed limit is 40 mph.
Give your answers to 2 decimal places.

5.

Lucy carried out a survey of 150 students to find out how many students play an instrument (I) and how many play for a school sports team (S).

63 students play on a school sports team.

27 students play an instrument and play on a school sports team.

72 students do not either play an instrument or play on a school sports team.

a Draw a Venn diagram to show Lucy's data.

b Work out the probability that a student plays an instrument.

c Work out the probability that a student plays an instrument given that they play on a school sports team.

6.

There are 80 students at a language school.

All 80 students speak at least one language from French, Italian and Spanish.

7 of the students speak French, Italian and Spanish.

15 of the students speak French and Italian.

26 of the students speak French and Spanish.

17 of the students speak Italian and Spanish.

41 of the students speak French.

52 of the students speak Spanish.

a Draw a Venn diagram to show this information. **(3 marks)**

One of the students is chosen at random.

b Work out the probability that this student speaks French but not Italian. **(2 marks)**

Given that the student speaks Spanish,

c work out the probability that this student also speaks French. **(2 marks)**

7.

Lewis surveyed 140 students in his year group to find out if they sent text messages or emails last week.

79 students sent text messages and emails.

126 students sent text messages.

a Draw a Venn diagram to show Lewis's data.

A student is chosen at random.

b Work out the probability that the student sent an email last week.

c Given that the student sent a text message, work out the probability that they sent an email.

8.

Georgia carries out a survey of 50 people.
5 people are married and aged under 25.
27 people are married.

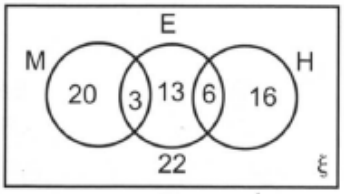
a Draw a Venn diagram to show Georgia's survey results.

b Work out the probability that a person chosen at random is married.

c Work out the probability that a person chosen at random is married given that they are under 25.

9.

The Venn diagram shows the numbers of students who take maths (M), English (E) and history (H).



Work out

a $P(M \cup E)$

b $P(E \cap H \mid E)$

10.

The Venn diagram shows customers' choice of sausages (S), bacon (B) and egg (E) fillings for an all-day-breakfast sandwich in a cafe.

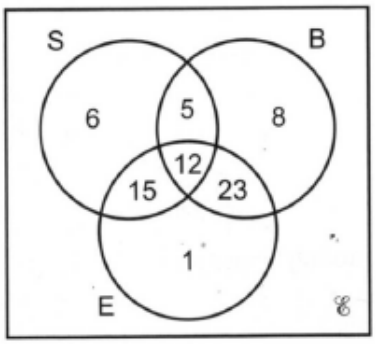
a How many people chose all three fillings? *(1 mark)*

A customer is chosen at random. Work out

b i $P(B \cap E)$ *(1 mark)*

ii $P(S \cap B \cap E)$ *(2 marks)*

iii $P(S \cap E \mid S)$ *(2 marks)*



11.

A gym offers three different classes: Total Spin (T), Bootcamp (B) and Zumba (Z).
70 members of the gym were asked which of these classes they had attended.

- 24 people had attended Total Spin.
- 28 people had attended Bootcamp.
- 30 people had attended Zumba.
- 10 people had attended Total Spin and Bootcamp.
- 12 people had attended Bootcamp and Zumba.
- 7 people had attended Total Spin and Zumba.
- 4 people had attended all three classes.

a Draw a Venn diagram to represent this information.

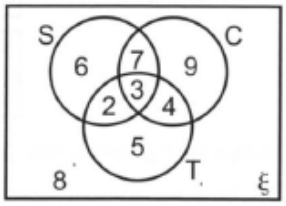
A person is picked at random.

b Work out i $P(T \cup B \cup Z)$ ii $P(Z \mid B \cup T)$ iii $P(B \mid Z')$

12.

The Venn diagram shows the ice-cream flavours chosen by a group of 44 children at a party.
The choices are strawberry (S), choc-chip (C) and toffee (T).
A child is picked at random.
Work out

a P(S)
b P [(S ∪ C ∪ T)']
c P(T ∪ C | C)
d P(C | S ∪ T)



Q4 hint Check the set notation – see Key points 5 and 6.