S148 Conditional probability

Q1.

There are 72 guests staying in a hotel.
They are French or German or Spanish.

The two-way table shows some information about the guests.

	French	German	Spanish	Total
Female	17		14	40
Male		13		32
Total	29		21	72

(a) Complete the two-way table.

(2)

One of these guests is picked at random.

(b) Write down the probability that the guest is female.

.....

(1)

One of the male guests is picked at random.

(c) Write down the probability that this male guest is German.

.....

(1)

(Total for Question is 4 marks)

Q2.

100 students each chose one activity.
Each student chose bowling or karting or ice skating.

The two-way table shows some information about the activities the students chose.

	Bowling	Karting	Ice skating	Total
Boys		13		47
Girls			34	
Total	26	20		100

(a) Complete the two-way table.

(3)

One of the boys is chosen at random.

(b) What is the probability that this boy chose karting?

.....

(2)

(Total for Question is 5 marks)

Q3.

60 people were asked if they prefer to go on holiday in Britain or in Spain or in Italy.

38 of the people were male.
11 of the 32 people who said Britain were female.
8 males said Italy.
12 people said Spain.

One of the females is chosen at random.

What is the probability that this female said Spain?

.....

(Total for question = 4 marks)

Q4.

A teacher asked 30 students if they had a school lunch or a packed lunch or if they went home for lunch.

17 of the students were boys.
4 of the boys had a packed lunch.
7 girls had a school lunch.
3 of the 5 students who went home were boys.

One of the boys is chosen at random. What is the probability that this boy had a packed lunch?

. . . . . .

(Total for Question is 4 marks)

Q5.

People can buy three types of plane tickets.

They can buy

an Economy ticket
a Premium ticket
or a Business ticket

200 people buy plane tickets.

92 males buy tickets
30 of the males buy Business tickets
62 females buy Economy tickets

A total of 44 people buy Business tickets.
A total of 60 people buy Premium tickets.

One of the males is chosen at random. What is the probability that this male buys Premium tickets?

.....

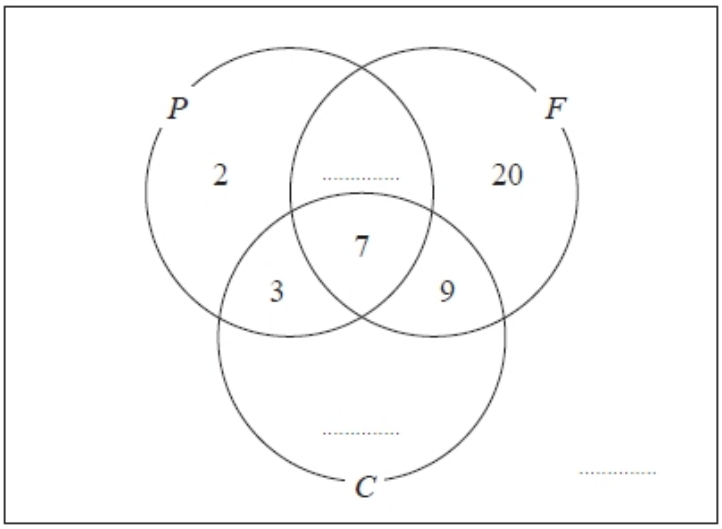
(Total for question = 4 marks)

Q6.

Sam wants to investigate what musical instruments people play.

He asked a sample of 100 people whether they play any or none of the piano (*P*), the flute (*F*) or the clarinet (*C*).

The incomplete Venn diagram shows some information about his results.



(a) Explain fully what the number 3 represents in the Venn diagram.

.....

.....

(1)

Of the 100 people Sam asked,

37 played the piano and the flute
31 played the clarinet.

(b) Complete the Venn diagram.

(2)

One of the 100 people Sam asked is chosen at random.

Given that this person played at least two of the instruments,

(c) find the probability that this person played all three of the instruments.

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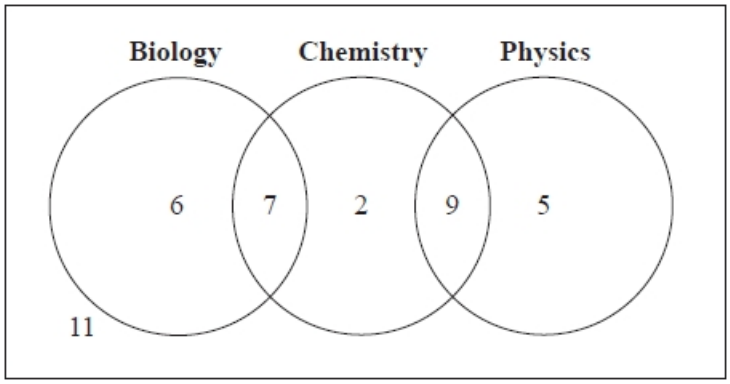
(2)

(Total for question = 5 marks)

Q7.

There are 40 students in Year 12 at a sixth form college. The Venn diagram gives information about the numbers of students studying Biology, Chemistry and Physics.



One of the 40 students is selected at random.

(a) Write down the probability that this student

(i) studies Biology,

.....

(1)

(ii) studies Chemistry and Biology.

.....

(1)

X is the event that the student selected studies Chemistry.
Y is the event that the student selected studies Physics.

(b) Find

(i) P(*X*)

.....

(1)

(ii) P(*X* and *Y*)

.....

(1)

(iii) $\mathrm{P}(Y \mid X)$

.....

(1)

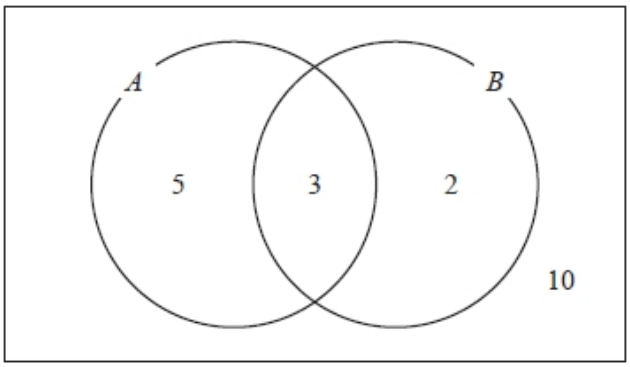
(Total for question = 5 marks)

Q8.

The Venn diagram shows information about 20 films shown in the UK in 2015

A is the event that the film was produced in the UK.
B is the event that the film made more than £40 million.

The numbers in the Venn diagram indicate the number of films.



(Source: *BFI Statistical Yearbook*)

(a) Explain fully what the number 3 represents in the Venn diagram.

.....

.....

(1)

One of the films is chosen at random.

(b) Find P(*B*)

.....

(1)

(c) Find P(*B* | *A*)

.....

(2)

(d) Using your answers to part (b) and part (c), explain whether or not *A* and *B* are independent events.

.....

.....

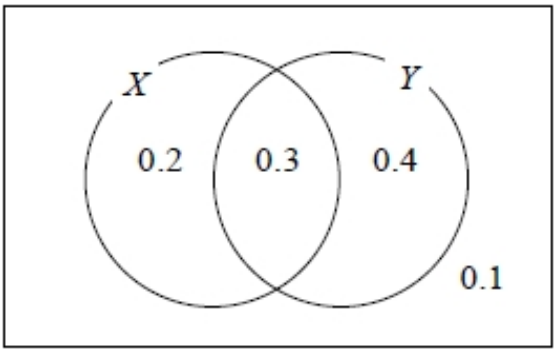
(2)

(Total for question = 6 marks)

Q9.

X and *Y* are two events.

The Venn diagram shows information about the probabilities of events related to *X* and *Y* happening.



(a) Find

(i) the probability of event *Y* happening

.....

(1)

(ii) P(*X* and *Y*)

.....

(1)

(iii) P(*Y* | *X*)

.....

(2)

Two different events *A* and *B* are independent

P(*A*) = 0.8 and P(*B*) = 0.5

(b) Find P(*A* and *B*)

.....

(2)

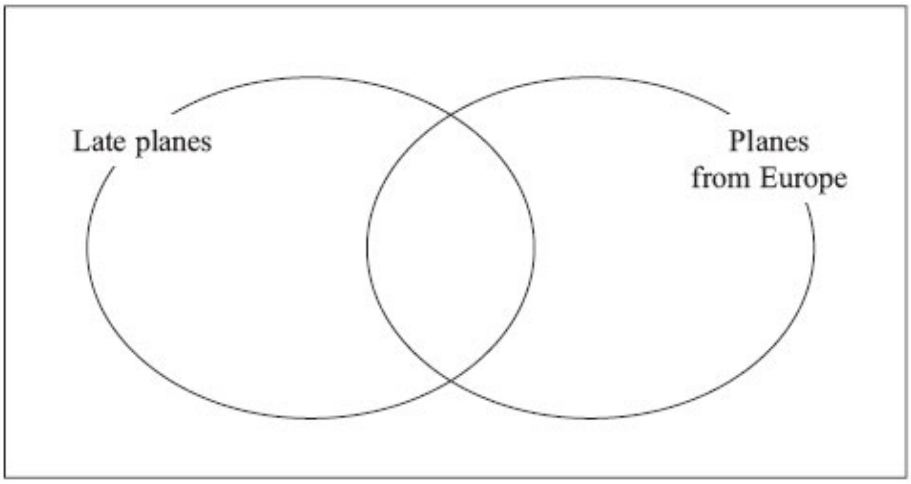
(Total for question = 6 marks)

Q10.

100 planes landed at Heathrow Airport in a 3 hour period.
40 of the planes were from Europe.
20 of the planes were late, including 5 planes from Europe.

Data source: adapted from www.FlightStats.com

(a) Complete the Venn diagram using the information above.



(3)

One of these planes is chosen at random.
(b) Find the probability that
(i) the plane was **not** from Europe.

.....

(ii) the plane was on time and was from Europe.

.....

(3)

Given that the plane was late,
(c) find the probability that the plane was from Europe.

.....

(2)

(Total for Question is 8 marks)

Q11.

Sami asked 50 people which drinks they liked from tea, coffee and milk.

All 50 people like at least one of the drinks
19 people like all three drinks.
16 people like tea and coffee but do **not** like milk.
21 people like coffee and milk.
24 people like tea and milk.
40 people like coffee.
1 person likes only milk.

Sami selects at random one of the 50 people.

(a) Work out the probability that this person likes tea.

.....

(4)

(b) Given that the person selected at random from the 50 people likes tea, find the probability that this person also likes exactly one other drink.

.....

(2)

(Total for question = 6 marks)

Q12.

Claire buys packs of sports cards.

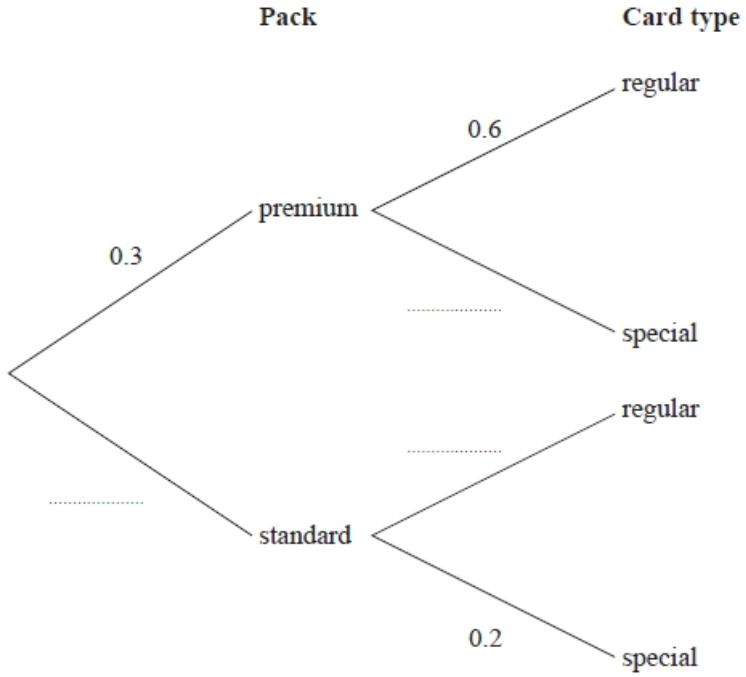
The cards can be bought in premium packs and in standard packs.

Of the packs that Claire buys, 30% are premium packs and 70% are standard packs.

In each premium pack there are 6 regular cards and 4 special cards.

In each standard pack there are 4 regular cards and 1 special card.

(a) Complete the probability tree diagram for this information.



(1)

Claire picks at random one of the packs she has bought, opens the pack and takes at random one card from the pack.

(b) Work out the probability that the card is a regular card.

.....

(3)

Given that the card is a regular card,

(c) work out the probability that it came from a premium pack.

.....

(2)

(Total for question = 6 marks)

Q13.

A farmer supplies both free-range eggs and barn eggs.

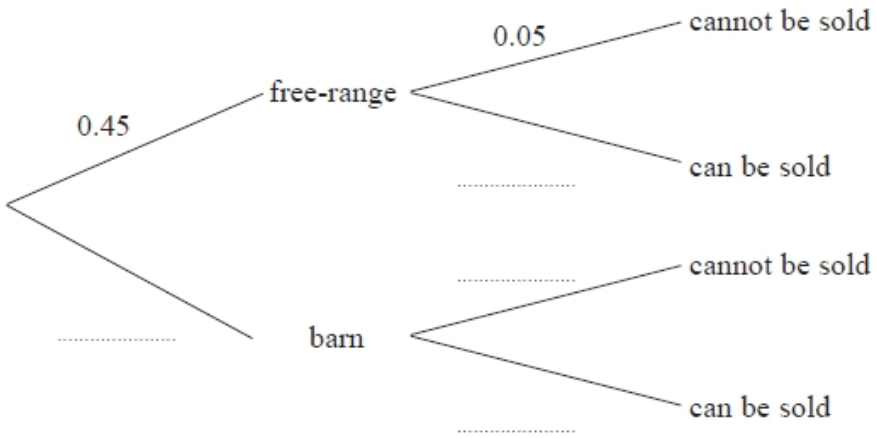
45% of the eggs are free-range. The rest are barn eggs.

An egg cannot be sold when it does not meet a particular standard.

5% of the free-range eggs cannot be sold.

8% of the barn eggs cannot be sold.

(a) Complete the probability tree diagram to show this information.



(2)

One egg is selected at random.

(b) Find the probability that it cannot be sold.

.....

(3)

One of the eggs that cannot be sold is selected at random.

(c) Find the probability that it is a free-range egg.

.....

(2)

(Total for Question = 7 marks)