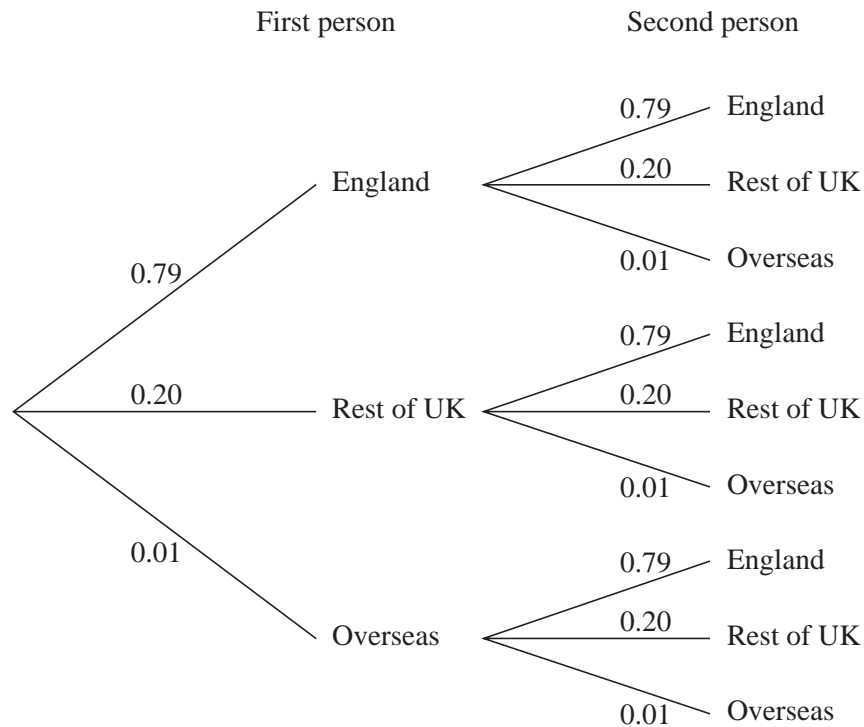


- 1 In a large town, 79% of the population were born in England, 20% in the rest of the UK and the remaining 1% overseas. Two people are selected at random.

You may use the tree diagram below in answering this question.



- (i) Find the probability that
- (A) both of these people were born in the rest of the UK, [2]
  - (B) at least one of these people was born in England, [3]
  - (C) neither of these people was born overseas. [2]
- (ii) Find the probability that both of these people were born in the rest of the UK given that neither was born overseas. [3]
- (iii) (A) Five people are selected at random. Find the probability that at least one of them was not born in England. [3]
- (B) An interviewer selects  $n$  people at random. The interviewer wishes to ensure that the probability that at least one of them was not born in England is more than 90%. Find the least possible value of  $n$ . You must show working to justify your answer. [3]

2 Steve is going on holiday. The probability that he is delayed on his outward flight is 0.3. The probability that he is delayed on his return flight is 0.2, independently of whether or not he is delayed on the outward flight.

(i) Find the probability that Steve is delayed on his outward flight but not on his return flight. [2]

(ii) Find the probability that he is delayed on at least one of the two flights. [3]

(iii) Given that he is delayed on at least one flight, find the probability that he is delayed on both flights. [3]

3 Sophie and James are having a tennis competition. The winner of the competition is the first to win 2 matches in a row. If the competition has not been decided after 5 matches, then the player who has won more matches is declared the winner of the competition.

For example, the following sequences are two ways in which Sophie could win the competition. (**S** represents a match won by Sophie; **J** represents a match won by James.)

**SJSS**

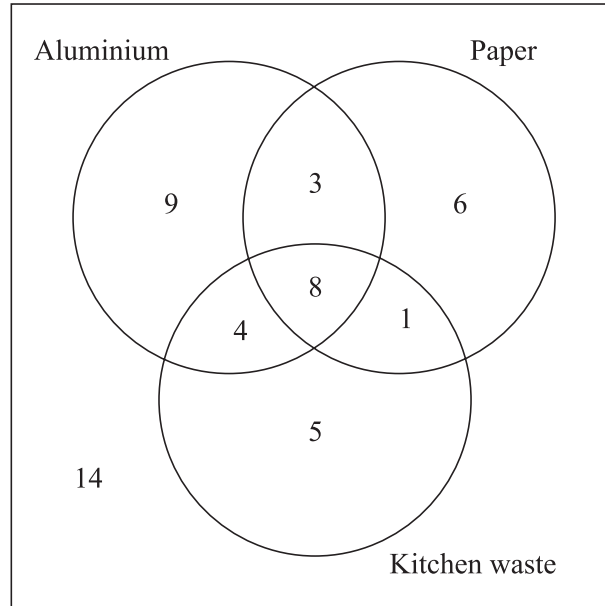
**SJSJS**

(i) Explain why the sequence **SSJ** is not possible. [1]

(ii) Write down the other three possible sequences in which Sophie wins the competition. [3]

(iii) The probability that Sophie wins a match is 0.7. Find the probability that she wins the competition in no more than 4 matches. [4]

- 4 A local council has introduced a recycling scheme for aluminium, paper and kitchen waste. 50 residents are asked which of these materials they recycle. The numbers of people who recycle each type of material are shown in the Venn diagram.



One of the residents is selected at random.

- (i) Find the probability that this resident recycles

(A) at least one of the materials,

[1]

(B) exactly one of the materials.

[2]

- (ii) Given that the resident recycles aluminium, find the probability that this resident does not recycle paper.

[2]

Two residents are selected at random.

- (iii) Find the probability that exactly one of them recycles kitchen waste.

[3]