8

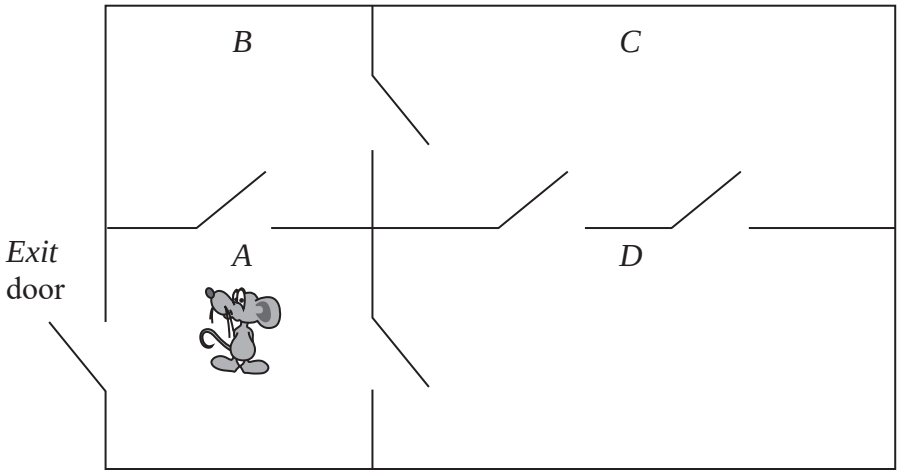

Figure 1

Sigmund is investigating the behaviour of his pet mouse, Morty, in a maze.
Figure 1 shows the maze with 4 rooms *A*, *B*, *C* and *D*. When Morty is in the maze, he can move around the maze leaving and entering rooms through two-way doors, shown in the diagram as

When in a room, Morty leaves the room and enters the next room by choosing a door at random. He is equally likely to choose any door in the room, including the door through which he entered the room.

Sigmund records a change of room as a move. So, *A* to *B* is one move, *A* to *B* to *C* is two moves. The investigation ends when Morty leaves room *A* by the *Exit* door.

(a) Morty is placed in room *A*, as shown in Figure 1.

(i) Write down the probability that the investigation will end after **one** move.

(1)

(ii) Find the probability that Morty will be back in room *A* after **two** moves.

(3)

(iii) Show that Morty is more likely to be in room *C* than to be in room *A* after **two** moves.

(3)

In a second investigation, Morty is placed in room *C*.

(b) Show that the probability that this investigation will end after **three** moves is 0.13 to 2 significant figures.

(3)

.....

.....

.....

Question 8 continued

Question 8 continued

Question 8 continued

(Total for Question 8 is 10 marks)