7.

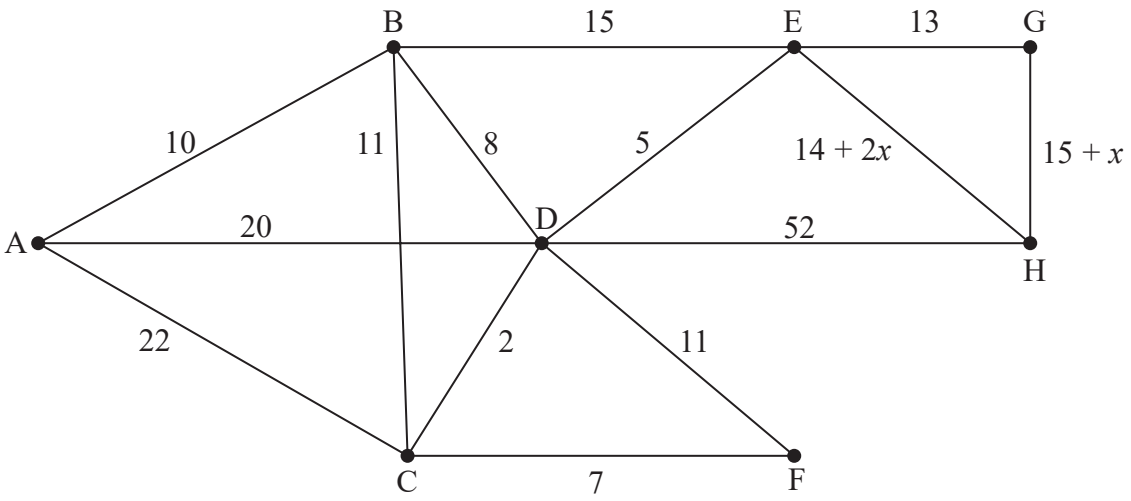


Figure 3

[*The total weight of the network is* $205 + 3x$]

Figure 3 represents a network of roads. The number on each arc represents the time taken, in minutes, to drive along the corresponding road.

Malcolm wishes to minimise the time spent driving from his home at A to his office at H. The delays from roadworks on two of the roads leading in to H vary daily, and so the time taken to drive along these roads is expressed in terms of x, where x is fixed for any given day and $x > 0$

(a) Use Dijkstra's algorithm to find the possible routes that minimise the driving time from A to H. State the length of each route, leaving your answer in terms of x where necessary.

(7)

On Monday, Malcolm needs to check each road. He must travel along each road at least once. He must start and finish at H and minimise the total time taken for his inspection route.

Malcolm finds that his minimum duration inspection route requires him to traverse exactly four roads twice and the total time it takes to complete his inspection route is 307 minutes.

(b) Calculate the minimum time taken for Malcolm to travel from A to H on Monday. You must make your method and working clear.

(4)

(Total 11 marks)