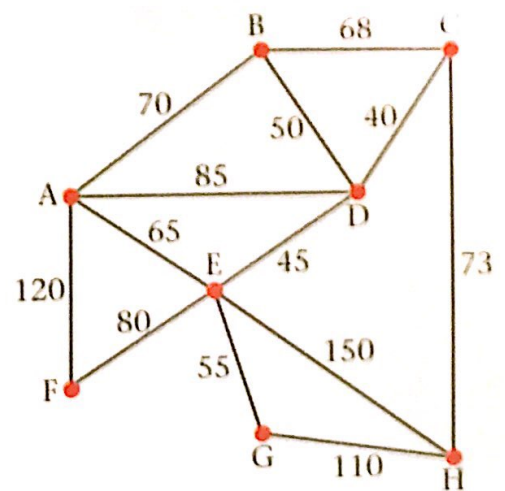


Route inspection (Chinese postman problem)

5 The network opposite represents the streets in a village. The number on each arc represents the length of the street in metres.

The junctions have been labelled A, B, C, D, E, F, G and H.

An aerial photographer has taken photographs of the houses in the village. A salesman visits each house to see if the occupants would like to buy a photograph of their house. He needs to travel along each street at least once. He parks his car at A and starts and finishes there. He wishes to minimise the total distance he has to walk.



- Describe an appropriate algorithm that can be used to find the minimum distance the salesman needs to walk.
- Apply the algorithm and hence find a route that the salesman could take, stating the total distance he has to walk.
- A friend offers to drive the salesman to B at the start of the day and collect him from C later in the day.

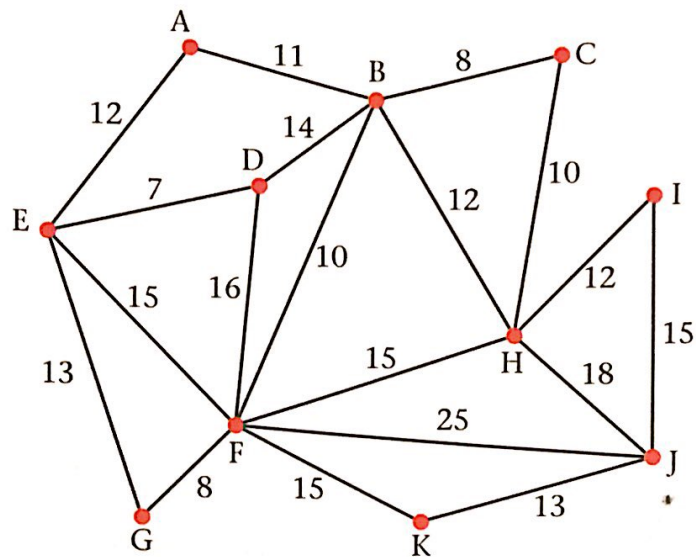
Explaining your reasoning, carefully determine whether this would increase or decrease the total distance the salesman has to walk.



6

... the salesman has to walk.

E



- a Describe an algorithm that is used to solve the route inspection (Chinese postman) problem.
 - b Apply the algorithm and find a route, starting and finishing at A, that solves the route inspection problem for the network shown.
 - c State the total length of your route.
- The situation is now altered so that, instead of starting and finishing at A, the route starts at one vertex and finishes at another vertex.
- d i State the starting vertex and the finishing vertex which minimises the total length of the route. Give a reason for your selections.
 - ii State the length of your route.
 - e Explain why, in any network, there is always an even number of vertices of odd degree.

E