PRIM's ALGORITHM

1.

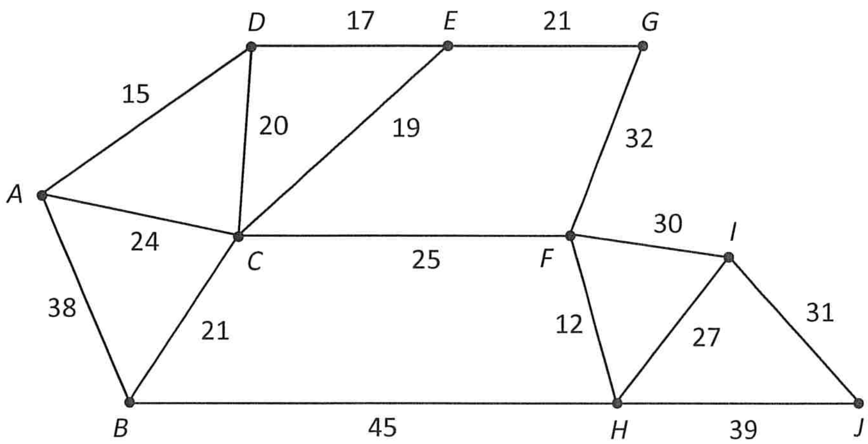
	A	B	C	D	E	F
A	-	7	3	-	8	11
B	7	-	4	2	-	7
C	3	4	-	5	9	-
D	-	2	5	-	6	3
E	8	-	9	6	-	-
F	11	7	-	3	-	-

The matrix represents a network of roads between six villages *A*, *B*, *C*, *D*, *E* and *F*. The value in each cell represents the distance, in km, along these roads.

Starting at D, use Prim's algorithm on the matrix (on the answer sheet) to find the minimum spanning tree. State the order in which you include the arcs. State the length of the minimum spanning tree and draw the minimum spanning tree.

(4 marks)

2.



The network above shows the distances, in metres, between 10 wildlife observation points. The observation points are to be linked by footpaths, to form a network along the arcs indicated, using the least possible total length.

(a) Find a minimum spanning tree for the network in Figure 2, showing clearly the order in which you selected the arcs for your tree, using Prim's algorithm, starting from A.

(4 marks)

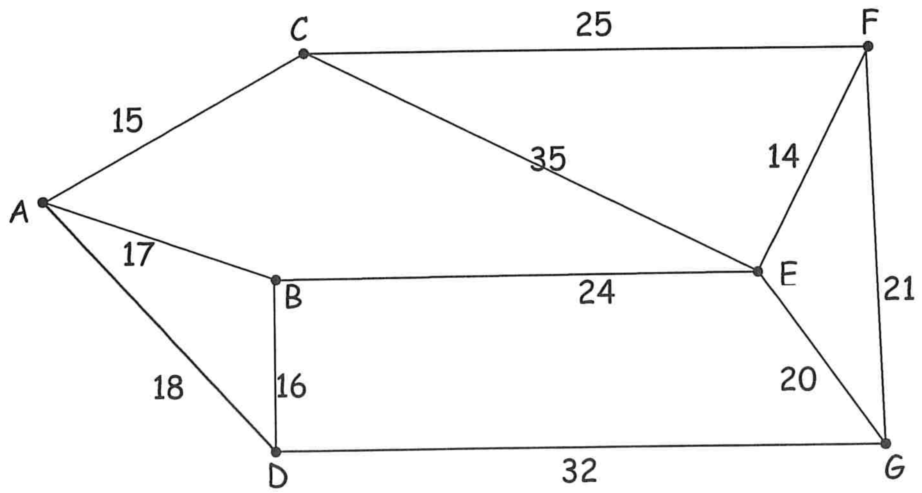
Given that footpaths are already in place along *AB* and *FI* and so should be included in the spanning tree,

(b) explain which algorithm you would choose to complete the tree, and how it should be adapted. (You do **not** need to find the tree.)

(4 marks)

3.(a) Describe the differences between Prim's algorithm and Kruskal's algorithm for finding a minimum connector of a network.

(2 marks)



(b) Listing the **arcs** in the order that you select them, find a minimum connector for this network using

(i) Prim's algorithm,

(4 marks)

(ii) Kruskal's algorithm.

(4 marks)

(Make sure that you draw the minimum connector)