Minimum Spanning Trees

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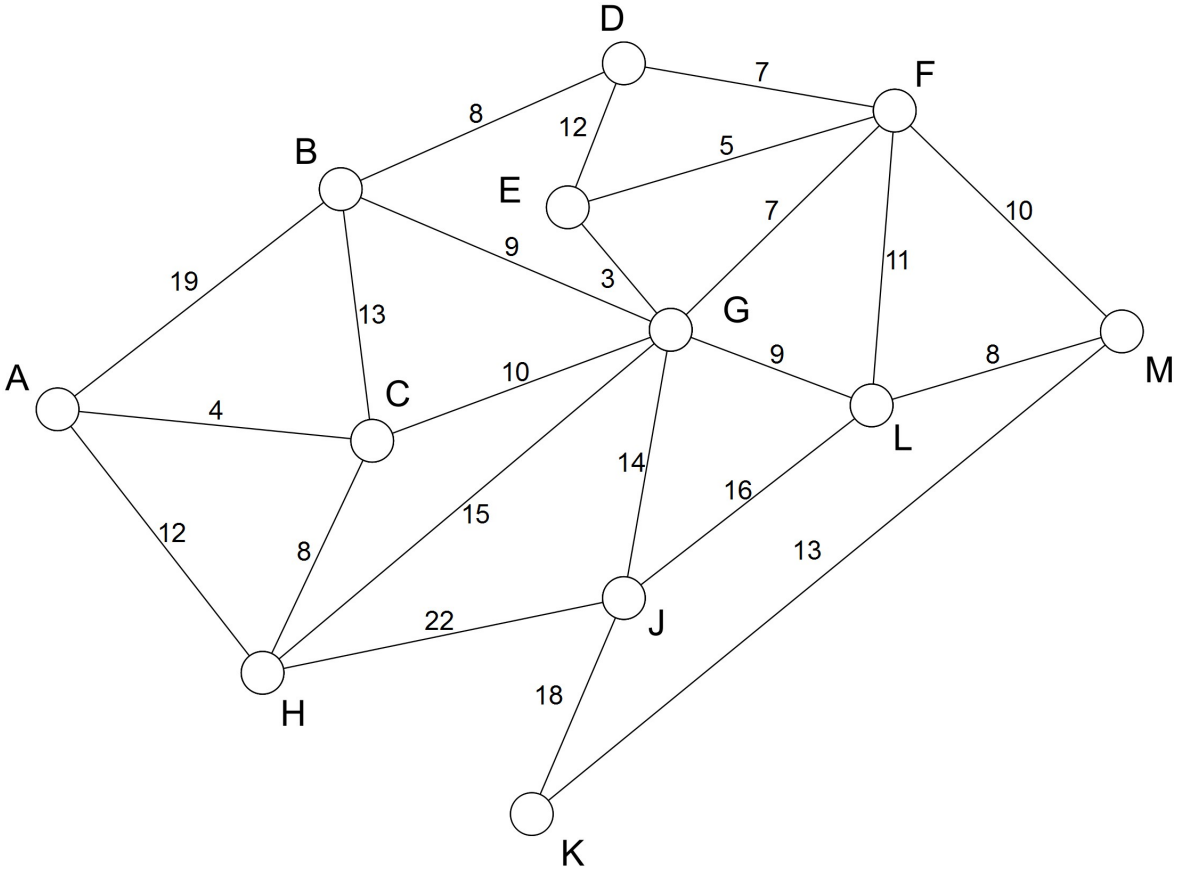
Where Are The Solutions?

Solutions are only available in the Word docx format of the resources. Press this button on the Home Tab of the Ribbon Bar which will hide or show hidden text.

Question

This network shows the cost of laying water pipes (in millions342 of dollars) between twelve country towns. The water supply authority wants to link the towns into a pipe network at the lowest possible cost.

a) Find the minimum spanning tree of the pipe network. Show your answer on the network below.



b) What is the minimum cost of building the network? (Don't forget that the prices are in millions of dollars).

c) The water authority calculates that it does not have sufficient funds to link all of the towns into the network and has to remove one town from the network. Which town should they remove from the network and how much would this save?

[4,1,2 = 7 Marks]

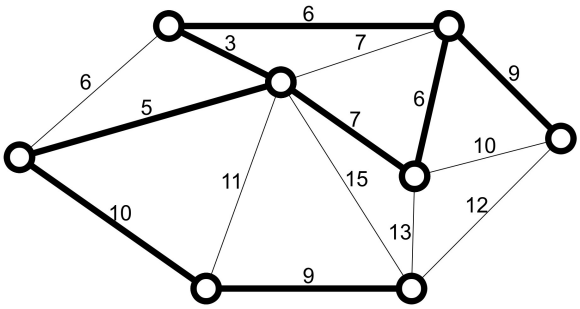
How We Drew The Diagrams

http://www.youtube.com/v/8bMSqYWU3Bs&hd=1&autoplay=1

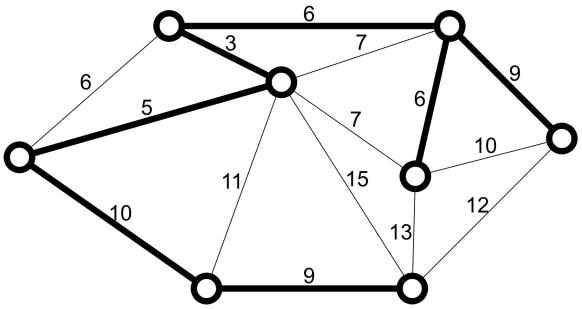
Question

Which of these options is the minimum spanning tree?

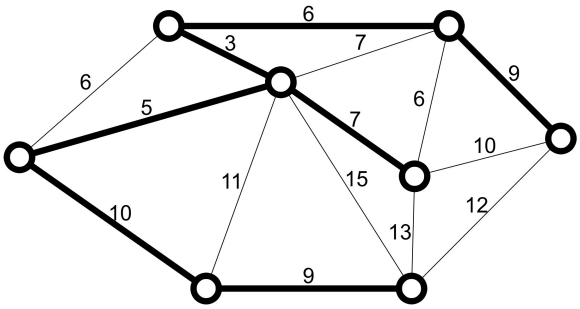
a)



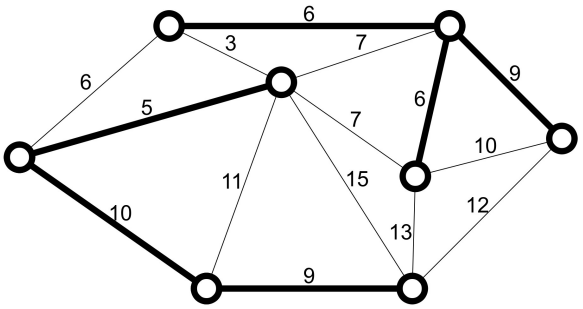
b)



c)



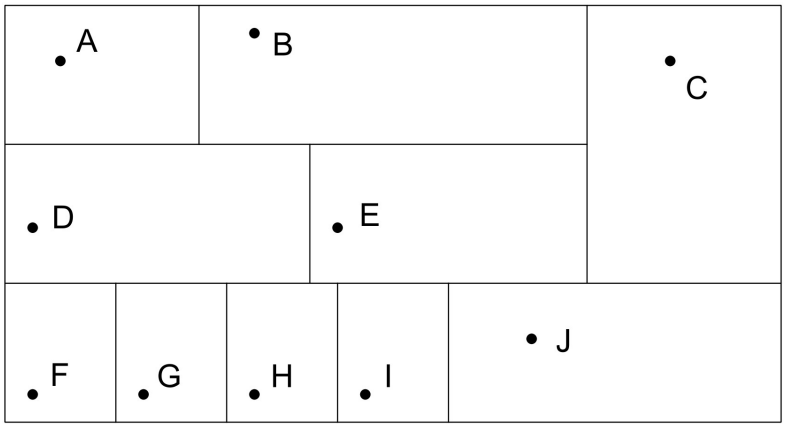
d)



[1 Mark]

Question

A company decides to network its computers. The computer terminals; A, B, C, D, E, F, G, H, I and J are located on one floor and need to be connected to each other.



The following table gives the distances (in metres) of feasible connections between the terminals.

	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
A	-	7	11	5	8	6	-	-	-	22
B	7	-	7	9	5	-	12	13	-	-
C	11	7	-	25	18	-	-	-	-	9
D	5	9	25	-	12	9	6	12	15	14
E	8	5	18	12	-	-	9	8	8	12
F	6	-	-	9	-	-	10	-	-	-
G	-	12	-	6	9	10	-	9	9	-
H	-	13	-	12	8	-	9	-	4	12
I	-	-	-	15	8	-	9	4	-	10
J	22	-	9	14	12	-	-	12	10	-

Cable used in the connections costs $15.50 per metre.

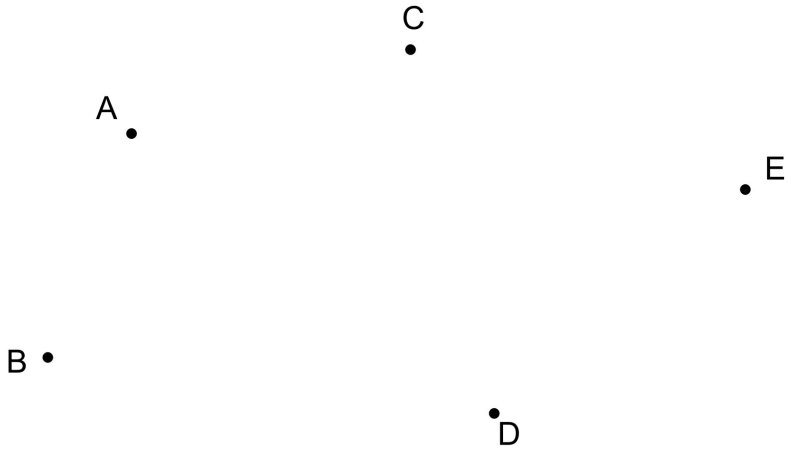
a) On the diagram, show the links that must be used to link the terminals together in the least costly way.
b) What is the minimum cost to link the computers?
c) When installing the new network, the installers discovered that the 9m link between C and J could not be used. What effect will this have on the minimum cost to link the computers?

[6,2,2 = 7 Marks]

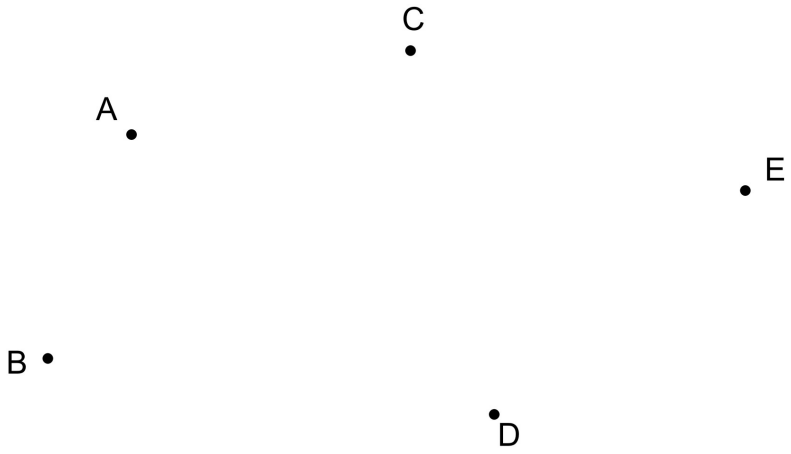
Question

a) Use the nodes below to draw a network for the following table which shows the cost in dollars of telecommunications cable connections for towns A, B, C, D and E:

	A	B	C	D	E
A	-	170	250	380	190
B	170	-	120	260	85
C	250	120	-	220	340
D	380	260	220	-	230
E	190	85	340	230	-



b) Use the nodes below to show how the towns can be connected to minimise the cost.



[3,3 = 6 Marks]