British Informatics Olympiad Final

28 – 30 March, 2008

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Paper Round

Delivering the Sunday papers throughout that small knot of villages known as the Endians is, quite literally, an uphill struggle. Sadly, as the bulk of the papers has increased the local infrastructure has not, and bicycling paperboys now spend more time planning their routes than delivering papers.

The local paperboys' union has rated all the roads between the villages, depending on length and hilliness. When travelling between two villages, the effort involved depends on the papers still to be delivered: it is the product of the road rating and the weight of the carried papers. When delivering papers, a paperboy will take the route between the villages that involves the smallest amount of effort.

For example, suppose that village 1 is connected to village 2 by a road rated 1, village 2 is connected to village 3 by another road rated 1 and village 2 is connected to village 4 by a road rated 2. A paperboy starts at village 1, with a paper of weight 2 to deliver to village 3 and one of weight 5 to deliver to village 4. He might cycle to village 2 (cost $(2 + 5) * 1$), then village 3 (cost 7), back to village 2 (cost 5) and finally to village 4 (cost 10); a total cost of 29. A better route is to cycle to village 2 (cost 7), then village 4 (cost 14), back to village 2 (cost 4) and finally to village 3 (cost 2); a total cost of 27.

The first line of the input will consist of a pair of integers, p ($1 \leq p \leq 20$) and v ($2 \leq v \leq 256$), indicating the number of papers to be delivered and the number of connected villages respectively. The next p lines will each contain a pair of integers, the first indicating the weight of a paper (between 1 and 100 inclusive) and the second its destination village (between 1 and v inclusive). Each successive line will consist of three integers, the first two (between 1 and v inclusive) indicating two villages directly connected by a road, followed by the rating for that road (between 1 and 100 inclusive). The input will be terminated by the line "`-1 -1 -1`".

It will be possible to get between any two villages on the map, either by a direct road or a sequence of roads, and no two villages are directly connected by more than one road. No two papers will be deliverable to the same village and no paper will be deliverable to village 1.

The output should consist of a single integer, the smallest amount of effort that must be expended to deliver all the papers, starting from village 1. The papers can be delivered in any order.

Sample Input

```
2 4
5 4
2 3
1 2 1
4 2 2
3 2 1
-1 -1 -1
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Sample Output

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27
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