Red-Blue MST

Input file:	`standard input`
Output file:	`standard output`
Time limit:	8 seconds
Memory limit:	1024 megabytes

You are given a connected undirected graph on n vertices. Each edge has a positive integer weight and is painted in one of two colors – red or blue. For each $k \in \{0, \ldots, n-1\}$, find the minimum possible weight of a spanning tree that contains exactly k red edges or decide that no such spanning tree exists.

Input

The first line of input contains the number of test cases Z ($1 \leq Z \leq 10\,000$). The descriptions of the test cases follow.

The first line of each test case contains integers n, m ($2 \leq n \leq 100\,000$, $n - 1 \leq m \leq 200\,000$) – the number of vertices and the number of edges.

Next m lines describe graph edges. Each line contains three integers u_i, v_i, w_i followed by a character c_i ($1 \leq u_i, v_i \leq n$, $u_i \neq v_i$, $1 \leq w_i \leq 10^6$, $c_i \in \{R, B\}$) – the two endpoints of an edge, its weight, and its color. The color red is denoted by R and the color blue is denoted by B.

It is guaranteed that the graph is connected. The sum of n over all test cases does not exceed 500 000. The sum of m over all test cases does not exceed 1 000 000.

Output

For each test case, print in a single line n integers $a_0, \ldots, a_{n-1}$. a_k should be the minimum possible weight of a spanning tree that contains exactly k red edges, or -1 if no such spanning tree exists.

Example

standard input	standard output
2 4 6 1 2 1 R 2 3 5 B 3 4 1 R 4 1 5 B 1 3 1 R 2 4 3 B 3 3 1 2 5 R 1 3 7 R 2 3 9 B	13 9 5 3 -1 14 12