

7621 Query on a graph

You are given a connected simple graph (in which both multiple edges and loops are disallowed) with N nodes and N edges. In this graph each node has a weight, and each edge has the same length of one unit. Define $D(u, v)$ as the distance between node u and node v . Define $S(u, k)$ as the set of nodes x which satisfy $D(u, x) \leq k$.

We will ask you to perform some instructions of the following forms.

MODIFY $u k d$: weight of all nodes in $S(u, k)$ increase by d or decrease by $-d$.

QUERY $u k$: ask for the sum of weight of all nodes in $S(u, k)$. In the beginning, the weight of all nodes are 0.

Input

The first line of input contains an integer t , the number of test cases. t test cases follow.

For each test case, in the first line there is an integer N ($N \leq 100000$). The i -th line of the next N lines describes the i -th edge: two integers u, v denotes an edge between u and v .

In the next line, an integer Q ($Q \leq 100000$) indicates the number of instructions. Next Q lines contain instructions 'MODIFY $u k d$ ' or 'QUERY $u k$ ', where $|d| \leq 100$ and $0 \leq k \leq 2$.

Output

For each 'QUERY' instruction, output a integer in a line.

Sample Input

```
2
6
1 2
2 3
3 4
4 1
4 5
3 6
5
MODIFY 1 1 3
MODIFY 3 1 2
MODIFY 5 2 1
QUERY 3 2
QUERY 4 1
6
1 2
2 3
3 1
1 4
2 5
3 6
5
MODIFY 3 1 5
```

```
MODIFY 2 2 2
QUERY 6 1
MODIFY 4 1 -2
QUERY 2 2
```

Sample Output

```
21
14
14
28
```