Virus Experiment

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2.5 seconds
Memory limit:	512 megabytes

In 2202, the Coronavirus pandemic sweeps the country Y again. As a researcher in country Y, Dr. W hopes to find a way to fight the virus.

Dr. W has an experiment equipment, which consists of n nodes and $n-1$ bidirectional pipes, the i-th pipe connects u_i, v_i. Any pair of nodes can reach each other through the pipe. Dr. W has four kinds of operating devices, which can perform one of the four operations of `abcd` respectively. On each pipe, there is exactly one kind of operation that can be performed by the operating device. The operating device on the i-th pipe performs c_i operation on the virus.

Dr. W will do experiments for q times. In the i-th experiment, two nodes s_i, t_i will be selected, and then Dr. W will put the virus into the node numbered s_i, let it reach the node numbered t_i through the shortest path, and then take it out. Virus will be operated by the operating devices on the shortest path one by one.

Dr. W found that if a certain operation sequence is the same as the reverse of it, the virus may mutate uncontrollably after this operation. For example, a virus operated by `a`, `abba` or `cabac` is uncontrollable, while a virus operated by `ab` or `bba` are not. In particular, the initial virus without any operation is controllable.

In an experiment, if the virus is uncontrollable when it reaches a certain node u, the node u is said to be dangerous. **The risk level** of an experiment is defined as the number of dangerous nodes on the path.

In order to estimate the risk of the experiments, Dr. W wants you to tell him **the risk level** of each experiment.

Input

The first line contains two integers n and q.

Next $n-1$ lines, each with two integers u_i, v_i and a character c_i.

Next q lines, each with two integers s_i and t_i.

Output

q lines, each with an integer representing the risk level of an experiment.

Examples

standard input	standard output
7 5 1 2 a 2 3 a 3 4 a 2 5 b 1 6 b 6 7 a 2 7 4 7 3 6 6 3 4 1	2 3 2 1 3
12 12 1 2 a 2 3 b 3 4 a 4 5 b 5 6 b 6 7 a 7 8 b 8 9 a 9 10 b 10 11 a 11 12 b 1 12 2 12 3 12 4 12 5 12 6 12 7 12 8 12 9 12 10 12 11 12 12 12	3 3 2 2 4 3 3 2 2 1 1 0

Note

Subtask 1 (5pts): $n, q \leq 100$.

Subtask 2 (12pts): $n, q \leq 2000$.

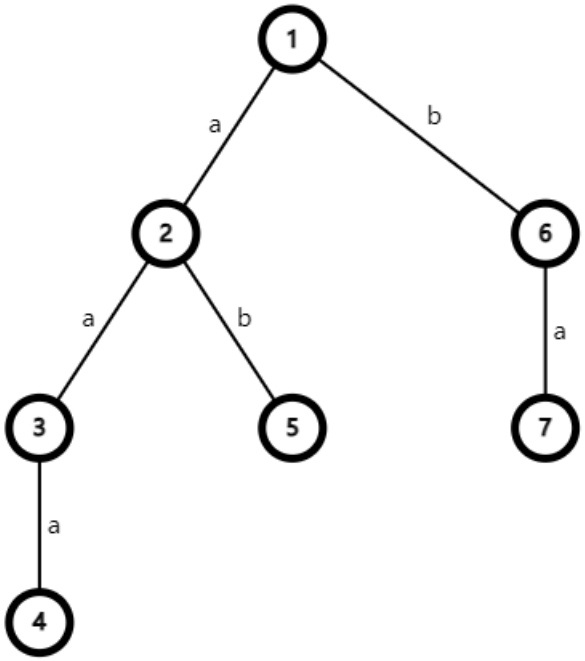
Subtask 3 (21pts): $n, q \leq 40000$.

Subtask 4 (17pts): The tree is guaranteed to be a chain.

Subtask 5 (45pts): No special properties.

For 100% data, $1 \leq n, q \leq 10^5$, $1 \leq u_i, v_i, s_i, t_i \leq n, c_i \in \{\mathtt{a}, \mathtt{b}, \mathtt{c}, \mathtt{d}\}$.

Explanation of example 1



The total operation sequences of the five experiments are: `aba`, `aaaba`, `aab`, `baa`, `aaa`.

Take the first experiment as an example:

After reaching the node 1, the operation sequence is `a`, and after reaching the node 7, the operation sequence is `aba`. These two operation sequences are the same as the reverse, so node 1 and node 7 are dangerous.

After reaching the node 2, the operation sequence is `ab`, and the reverse is `ba`, which is different from the original sequence, so it is not dangerous.

There are a total of 2 nodes that are dangerous, so **the risk level** for this experiment is 2.