Problem B

You are given a tree T and the length of each of its edges. For a sequence of pairs u, v of vertices of T, determine the distance between u and v in T. You can get half of the points for a solution that knows the sequence in advance.

Input and output

The first line contains two integers n and b ($1 \leq n \leq 10^5$, $0 \leq b < n$), where n is the number of vertices of the tree. The vertices are numbered from 0 to $n-1$. The i-th of the following $n-1$ lines contains two integers p and l ($0 \leq p < i$, $0 \leq l \leq 1000$), indicating that the vertices i and p are joined by an edge of length l.

On each of the following (at most 300 000) lines, there is a pair of integers u' and v' ($0 \leq u', v' < n$). Let r be the last number you wrote out ($r = 0$ at the beginning). Let $u = (u' + br) \bmod n$ and $v = (v' + br) \bmod n$. Write out the distance between the vertices u and v in T.

For half the points, you can assume that $b = 0$, and thus $(u, v) = (u', v')$.

Example

Input:

```
4 2
0 1
0 2
2 3
1 2
1 2
```

Output:

```
3
5
```

Note: The second query decodes to $u = 3$ and $v = 0$.