DMPG '18 G3 - Lonely Carrot's Anguish

The land of carrot trees is a magical land tree with N nodes and N-1 edges, rooted at node 1. One day, a lonely carrot decides to ask Q queries of the form n d: the number of unordered pairs of nodes that have a depth between $\operatorname{depth}(n)$ and $\operatorname{depth}(n)+d$ have node n as their lowest common ancestor. Note that these pairs may include the node n itself and the pair may be two of the same node. Also note that this d can be larger than the height of the subtree from n. Can you help the poor carrot with these queries?

Note: The **lowest common ancestor** of nodes u and v is the furthest node from the root that is on the path from u to the root and on the path from v to the root.

Constraints

For all subtasks, $1 \leq a_i, b_i \leq N$ and $1 \leq n_i \leq N$.

Subtask 1 [10%]

 $\begin{array}{l} 1 \leq N \leq 200\,000 \\ 1 \leq Q \leq 200\,000 \\ d_i = N \end{array}$

Subtask 2 [20%]

 $\begin{array}{l} 1 \leq N \leq 2\,000 \\ 1 \leq Q \leq 2\,000 \\ 0 \leq d_i \leq N \end{array}$

Subtask 3 [70%]

 $\begin{array}{l} 1 \leq N \leq 200\,000 \\ 1 \leq Q \leq 200\,000 \\ 0 \leq d_i \leq N \end{array}$

Input Specification

The first line will have N, the number of nodes.

The next N-1 lines will have two integers, a_i and b_i , indicating that there is an edge from a_i to b_i .

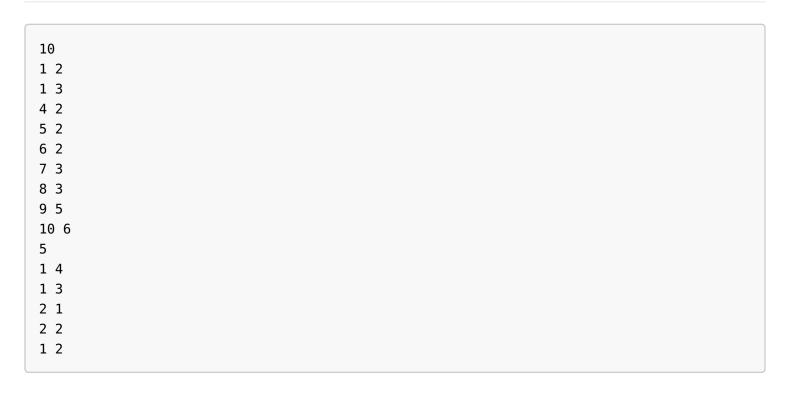
The next line will have Q, the number of queries that follow.

The next Q lines will have two space separated integers, n_i and d_i , the n and d values for the $i^{
m th}$ query.

Output Specification

The answer to each query, each on a new line.

Sample Input



Sample Output

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28
28
7
14
20
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Explanation for Sample

For the third query for example, the 7 unordered pairs are (2,2),(2,4),(2,5),(2,6),(4,5),(4,6),(5,6).