Tree Infection

You are given a rooted tree consisting of N vertices, along with integers R and M. The vertices are numbered from 1 to N, with vertex 1 as a root. Each of the other vertices has a single parent in the tree.

If a vertex s is chosen, it becomes infected along with all its descendants (i.e. vertices that can be reached by following edges downward from s) at a distance of R or less, where distance is calculated as the number of edges between vertices. A vertex u is considered reachable from vertex v if and only if neither of them is infected, and the number of infected vertices on the path between them **does not exceed** M.

For each possible chosen vertex s ($1 \leq s \leq N$), you must calculate the number of vertex pairs (u, v) such that $1 \leq u < v \leq N$ and u is reachable from v (and vice versa).

Input Format

The first line contains three integers: N, R and M.

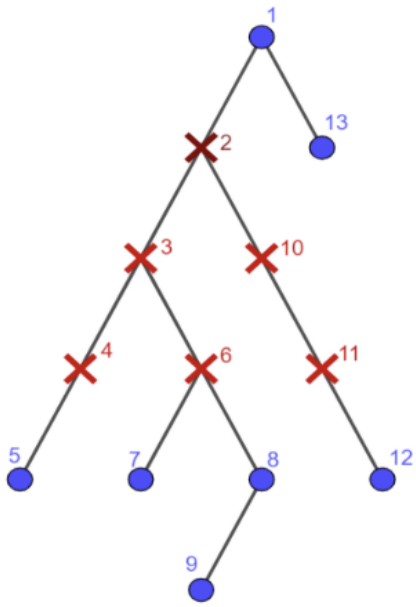
The second line contains $N - 1$ integers: $p[2]$, $p[3]$, ... ,$p[N]$, the parents of the vertices 2, 3, ... ,N, respectively.

Output Format

Print N lines with single integer each: s-th line should contain required number of pairs when the chosen vertex is s.

Example 1

Standard input	Standard output
13 2 2	16
1 2 3 4 3 6 6 8 2 10 11 1	4
	15
	55
	66
	36
	66
	55
	66
	45
	55
	66
	66



The image above corresponds to $s = 2$.

The reachable pairs are: (1,13), (7,8), (7,9), (8,9).

This list doesn't include the pair (1,2) since vertex 2 is infected. Similarly, the pair (1,5) is absent since the path between 1 and 5 has three infected vertices (2, 3 and 4).

Example 2

Standard input	Standard output
3 0 1	1
1 2	1
	1

Constraints

- $2 \leq N \leq 500\,000$
- $1 \leq p[i] < i$ (for each $2 \leq i \leq N$)
- $0 \leq R \leq N - 1$
- $0 \leq M \leq 2 \times R + 1$

Subtasks

1. (20 points) $N \leq 300$
2. (14 points) $R = 0$
3. (15 points) $M = 2 \times R + 1$
4. (10 points) $M = 2 \times R - 1$
5. (16 points) $N \leq 5\,000$
6. (25 points) No additional constraints.