

Problem G. LCA Counting

Input file: **standard input**
 Output file: **standard output**
 Time limit: **1 second**
 Memory limit: **256 megabytes**

You are given a rooted tree with n vertices and ℓ leaves. The vertices are indexed $1 \dots n$ and the root vertex is 1. Exactly k leaves u_1, \dots, u_k are chosen. Here, the root of the tree isn't considered a leaf, even if it has only one neighbor. What is the maximum cardinality of the set

$$\{\text{lca}(u_i, u_j) \mid 1 \leq i, j \leq k\}?$$

Here, $\text{lca}(u, v)$ refers to the lowest common ancestor of vertices u and v . Solve this problem for each k in $1 \dots \ell$, where ℓ is the number of leaves in the tree.

Input

The first line of the input consists of a single integer n ($2 \leq n \leq 2 \cdot 10^5$) — the number of vertices.

The second line consists of $n - 1$ integers p_2, p_3, \dots, p_n ($1 \leq p_i < i$), denoting an edge between p_i and i .

Output

Let ℓ be the number of leaves in the tree.

Print ℓ integers on a single line, the k -th of which is the answer to the problem if exactly k leaves are chosen.

Example

standard input	standard output
7 1 1 2 4 2 2	1 3 5 6