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time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given a rooted tree with root in vertex 1. Each vertex is coloured in some colour.

Let's call colour c dominating in the subtree of vertex v if there are no other colours that appear in the subtree of vertex v more times than colour c. So it's possible that two or more colours will be dominating in the subtree of some vertex.

The subtree of vertex v is the vertex v and all other vertices that contains vertex v in each path to the root.

For each vertex v find the sum of all dominating colours in the subtree of vertex v.

Input

The first line contains integer n ($1 \le n \le 10^5$) — the number of vertices in the tree.

The second line contains n integers c_i ($1 \le c_i \le n$), c_i — the colour of the i-th vertex.

Each of the next $n - 1$ lines contains two integers x_j, y_j ($1 \le x_j, y_j \le n$) — the edge of the tree. The first vertex is the root of the tree.

Output

Print n integers — the sums of dominating colours for each vertex.

Examples

input

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

output

```
10 9 3 4
```

input

```
15
1 2 3 1 2 3 3 1 1 3 2 2 1 2 3
1 2
1 3
1 4
1 14
1 15
2 5
2 6
2 7
3 8
3 9
3 10
4 11
4 12
4 13
```

output

```
6 5 4 3 2 3 3 1 1 3 2 2 1 2 3
```