

A long time ago in a galaxy far, far away, there were  $N$  planets. There were also  $N - 1$  interplanetary paths that connected all the planets (directly or indirectly). In other words, the network of planets and paths formed a tree. Additionally, each path was enumerated with an integer that denoted the **curiosity** of the path.

A pair of planets  $A, B$  is boring if the following holds:

- $A$  and  $B$  are different planets
- travelling between planet  $A$  and  $B$  is possible using one or more interplanetary paths
- binary **XOR** of the curiosity of all the paths in that travel is equal to 0

Alas, the times have changed and an evil emperor is ruling the galaxy. He decided to use the Force to destroy all the interplanetary paths in a **certain order**.

Determine the number of boring pairs of planets before the emperor started the destruction and after each destruction.

### INPUT

The first line of input contains the integer  $N$  ( $1 \leq N \leq 100\,000$ ).

Each of the following  $N - 1$  line contains three integers  $A_i, B_i, Z_i$  ( $1 \leq A_i, B_i \leq N, 0 \leq Z_i \leq 1\,000\,000\,000$ ) that denote that planets  $A_i$  and  $B_i$  are directly connected with a path of curiosity  $Z_i$ .

The following line of input contains the permutation of the first  $N - 1$  integers that denote the order in which the emperor is destroying the paths. If the  $i^{\text{th}}$  element of the permutation is  $j$ , then the emperor destroyed the path between planets  $A_j$  and  $B_j$  in the  $i^{\text{th}}$  step.

### OUTPUT

The output must contain  $N$  lines, the  $k^{\text{th}}$  line containing the number of boring pairs  $A, B$  from the task after the emperor destroyed exactly  $k - 1$  paths.

### SCORING

In test cases worth 20% of total points, it will hold  $N \leq 1\,000$ .

In test cases worth at least 30% of total points, every path's curiosity will be equal to 0.

### SAMPLE TESTS

<p><b>input</b></p> <pre>2 1 2 0 1</pre> <p><b>output</b></p> <pre>1 0</pre>	<p><b>input</b></p> <pre>3 1 2 4 2 3 4 1 2</pre> <p><b>output</b></p> <pre>1 0 0</pre>	<p><b>input</b></p> <pre>4 1 2 0 2 3 0 2 4 0 3 1 2</pre> <p><b>output</b></p> <pre>6 3 1 0</pre>
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**Clarification of the first example:** Before the destruction, the path between planets 1 and 2 is boring. After destruction, the path between them doesn't exist anymore.

**Clarification of the second example:** Before the destruction, pair of planets (1, 3) is boring. Travel between 1 and 3 is no longer possible after the first and after the second destruction, and none of the remaining pairs of planets is boring.

**Clarification of the third example:** Notice that in this example each pair of planets with a possible path between them is boring because all paths have the curiosity 0.