2872. Maximum Number of K-Divisible Components

Description

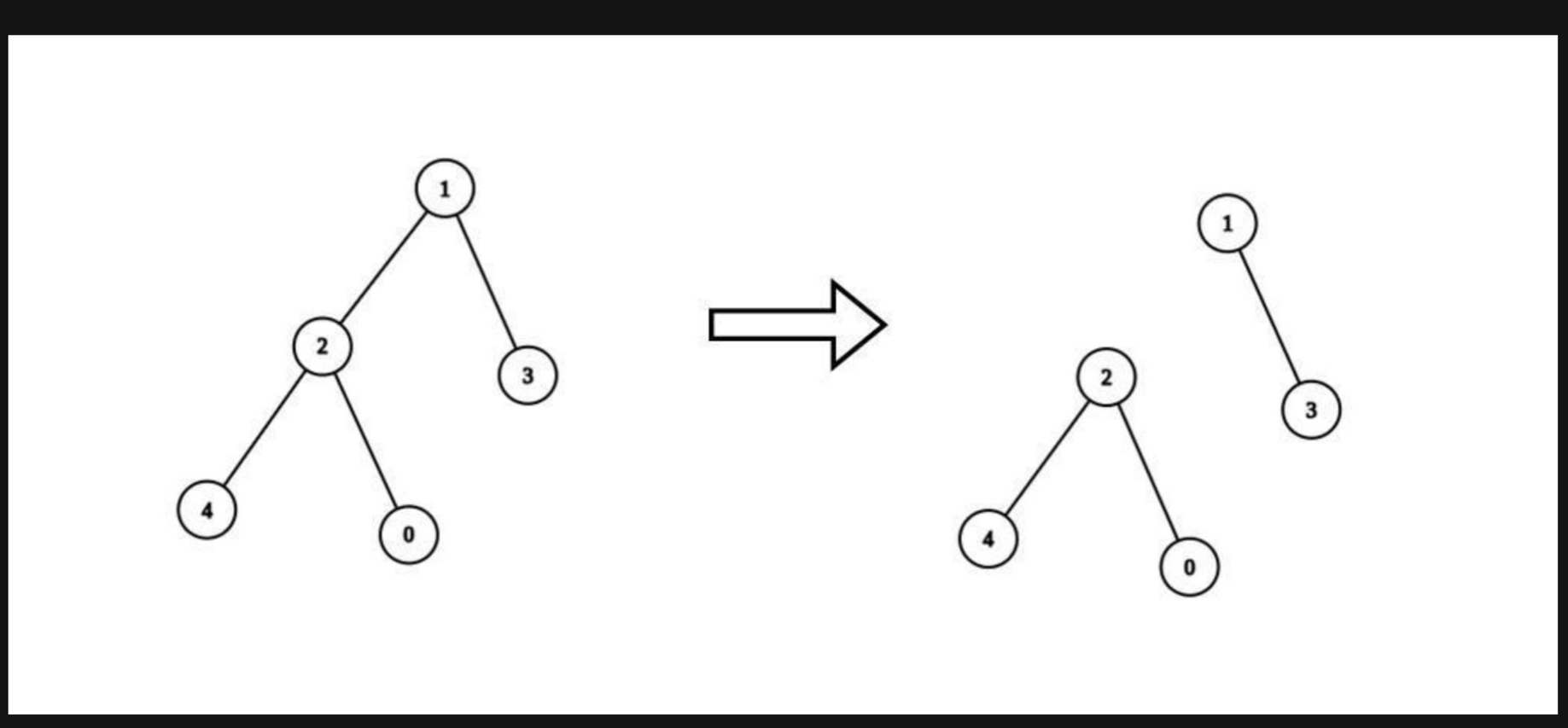
There is an undirected tree with `n` nodes labeled from `0` to `n - 1`. You are given the integer `n` and a 2D integer array `edges` of length `n - 1`, where `edges[i] = [a_i, b_i]` indicates that there is an edge between nodes `a_i` and `b_i` in the tree.

You are also given a **0-indexed** integer array `values` of length `n`, where `values[i]` is the **value** associated with the `i^th` node, and an integer `k`.

A **valid split** of the tree is obtained by removing any set of edges, possibly empty, from the tree such that the resulting components all have values that are divisible by `k`, where the **value of a connected component** is the sum of the values of its nodes.

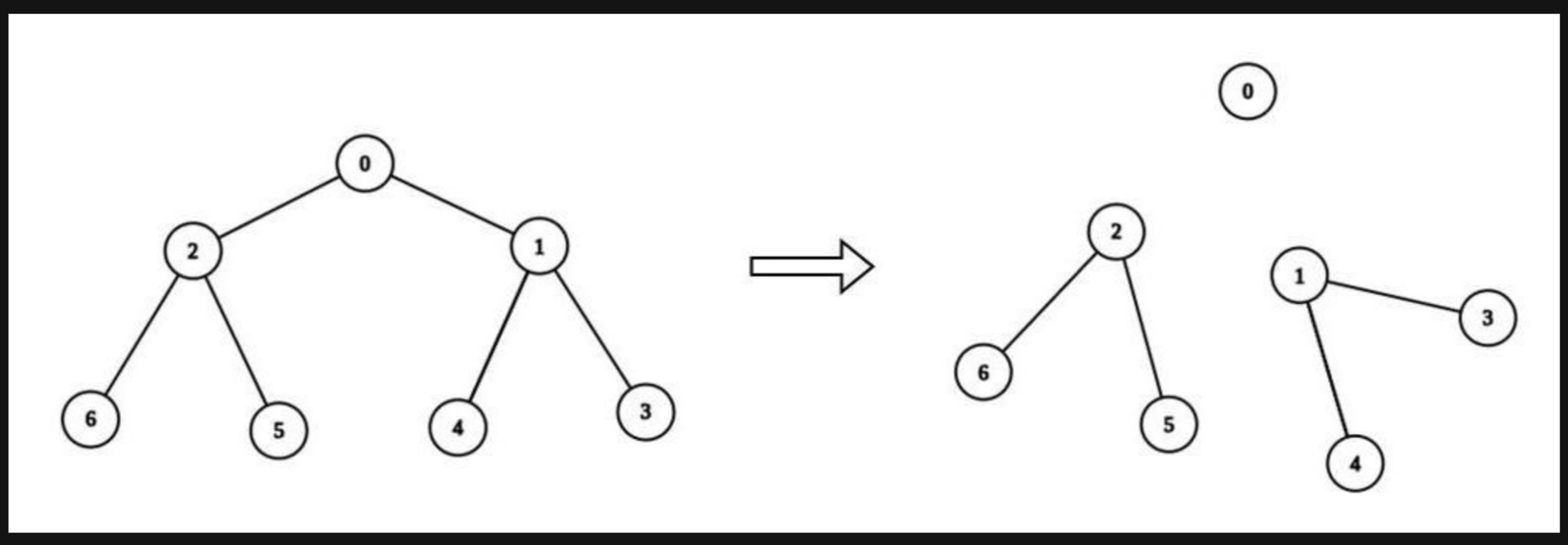
Return *the **maximum number of components** in any valid split*.

Example 1:




```
Input: n = 5, edges = [[0,2],[1,2],[1,3],[2,4]], values = [1,8,1,4,4], k = 6
Output: 2
Explanation: We remove the edge connecting node 1 with 2. The resulting split is valid because:
- The value of the component containing nodes 1 and 3 is values[1] + values[3] = 12.
- The value of the component containing nodes 0, 2, and 4 is values[0] + values[2] + values[4] = 6.
It can be shown that no other valid split has more than 2 connected components.
```

Example 2:




```
Input: n = 7, edges = [[0,1],[0,2],[1,3],[1,4],[2,5],[2,6]], values = [3,0,6,1,5,2,1], k = 3
Output: 3
Explanation: We remove the edge connecting node 0 with 2, and the edge connecting node 0 with 1. The resulting split is valid because:
- The value of the component containing node 0 is values[0] = 3.
- The value of the component containing nodes 2, 5, and 6 is values[2] + values[5] + values[6] = 9.
- The value of the component containing nodes 1, 3, and 4 is values[1] + values[3] + values[4] = 6.
It can be shown that no other valid split has more than 3 connected components.
```

Constraints:

- `1 <= n <= 3 * 10^4`
- `edges.length == n - 1`
- `edges[i].length == 2`
- `0 <= a_i, b_i < n`
- `values.length == n`
- `0 <= values[i] <= 10^9`
- `1 <= k <= 10^9`
- Sum of `values` is divisible by `k`.
- The input is generated such that `edges` represents a valid tree.