Echoes

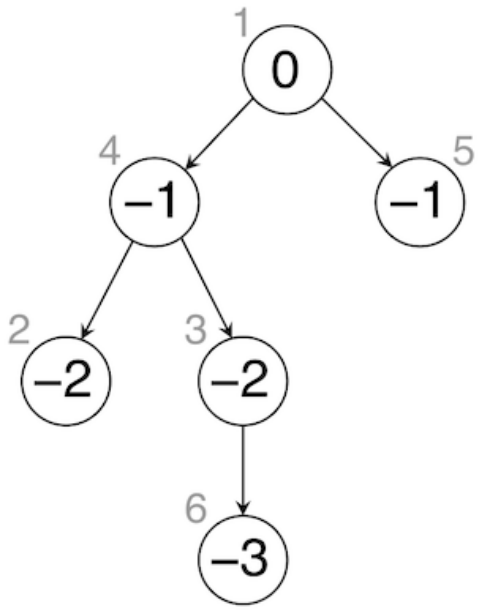
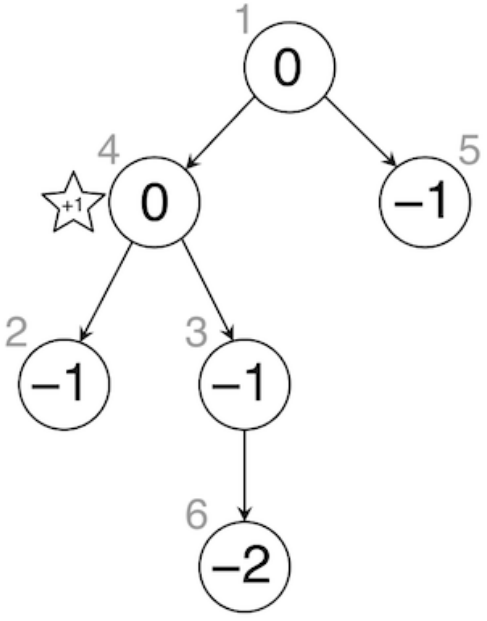
Task

In the ancient ruins of the Tomb of the Kings in Paphos, echoes propagate through a network of chambers connected by tunnels. The network is a tree-like structure with n chambers and $n-1$ tunnels. The entrance is located at chamber 1.

Each chamber contains an ancient artifact activated by the sound of echo. To activate the artifact in chamber i, the strength of echo in this chamber must be at least d_i.

The strength of the echo is an integer number. Note that it can be negative. The echo starts at the entrance (chamber 1) with strength 0 and spreads throughout tunnels away from the entrance. Every time the echo moves through a tunnel, its strength decreases by 1.

To increase the strength of the echo, you may use special resonators. If you put a resonator in some chamber, the strength of echo in this room will be increased by one. This amplified echo will then be moving forward to further chambers, so as a result, the strength of the echo in all reachable chambers will be increased by one.

Echo strength without resonators	Echo strength with one resonator in chamber 4
	

You can put at most F resonators in each chamber.

Your task is to find the minimal number of resonators needed to activate all of the artifacts.

Input format

The first line of the input contains integers n ($2 \leq n \leq 2 \cdot 10^5$) and F ($0 \leq F \leq 2 \cdot 10^9$).

The second line contains n integers $d_1 \ldots d_n$ ($|d_i| \leq 10^9$).

The next $n-1$ lines each contain two integers u, v meaning that a tunnel exists between chambers u and v ($1 \leq u, v \leq n$).

Output format

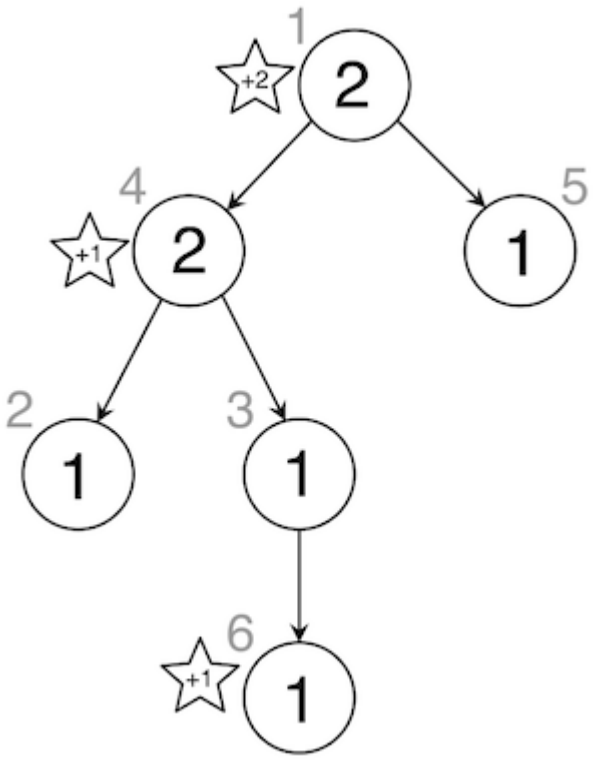
Output one integer: the minimal number of resonators needed to make the echo strength reaching each chamber i at least d_i.

If it is impossible to activate all the artifacts, output -1.

Example

Sample Input	Sample Output
6 2 2 -1 0 2 0 1 1 4 1 5 2 4 4 3 3 6	4
2 0 1000000000 -1 1 2	-1
5 3 -2 1 5 3 2 4 1 3 5 4 2 3 1	7

Here is an illustration for the first example:



Subtasks

This task contains six subtasks. To get the points for the subtask, your solution should pass all the tests in the corresponding subtask.

Subtask	Constraints	Points
1	$n \leq 8$, $F \leq 5$	12
2	For each i from 1 to $n-1$, nodes i and $i+1$ are connected with a tunnel	25
3	$F = 2 \cdot 10^9$	13
4	$F = 0$	9
5	$n \leq 1000$	16
6	No additional constraints	25