Problem G. MofK and Equipment Installation

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	256 megabytes

TrungNotChung has moved the equipments to the VNOI Cup competition location. At the same time, *darkkcyan* has planned the positions for the contestants, and *lanhf*, *tahp*, and *FireGhost* have just finished packing the clothes. So, the young team together unloads the equipment from the vehicle, moves them into the competition room, and starts installing them!

There are n pieces of equipment on the vehicle, numbered from 1 to n. The i-th piece has a weight of a_i. To move and install the equipment in a scientific way, the team will move the pieces that need to be installed first into the competition room, and then the other pieces. After observing for a while, the team realizes that for each piece u ($2 \le u \le n$), there exists a piece p_u ($1 \le p_u < u$) that needs to be installed **after** piece u is installed. Therefore, the piece 1 is always the last piece to be installed.

Due to the narrow vehicle body, only one piece can be taken out of the vehicle at a time. If the i-th piece moved out of the vehicle is u, the time to move this piece out of the vehicle is $i \cdot a_u$ time units, as the team gets tired and moves slower the longer they work.

MofK is assigned to supervise the installation of the pieces into the competition room. To ensure the progress of the work, *MofK* needs to arrange and assign the team members to unload and move the pieces into the competition room as quickly as possible. Given the list of piece weights and the list of dependencies between them, help *MofK* find the minimum total time for the team to unload all the items from the vehicle.

Input

The first line contains an integer n ($1 \le n \le 150\,000$) — the number of pieces to be installed in the competition room.

The second line contains n integers separated by spaces $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^8$) — the weights of the pieces.

The third line contains $n - 1$ integers separated by spaces $p_2, p_3, \ldots, p_n$ ($1 \le p_i < i$) — describing the dependencies between the pieces.

Output

Print a single integer — the minimum total time for the team to unload all the pieces from the vehicle.

Scoring

Subtask	Score	Constraints
1	250	$a_{p_i} \le a_i$ for all $2 \le i \le n$
2	1000	$n \le 2000$
3	1000	There exists k such that $3 \le k \le n$ and $p_k = 1$; otherwise, $p_i = i - 1$ for all $2 \le i \le n$, $i \ne k$
4	1000	No additional constraints
Total	3250	

Example

standard input	standard output
8 1 4 15 9 11 5 5 2 1 2 3 3 2 5 5	210

Note

For the first example, the optimal unloading plan for the team is as follows:

$$4 \to 7 \to 8 \to 5 \to 3 \to 6 \to 2 \to 1$$

The total time for this unloading plan is:

$$\begin{aligned} & 1 \cdot a_4 + 2 \cdot a_7 + 3 \cdot a_8 + 4 \cdot a_5 + 5 \cdot a_3 + 6 \cdot a_6 + 7 \cdot a_2 + 8 \cdot a_1 \\ = \; & 1 \cdot 9 + 2 \cdot 5 + 3 \cdot 2 + 4 \cdot 11 + 5 \cdot 15 + 6 \cdot 5 + 7 \cdot 4 + 8 \cdot 1 \\ = \; & 210 \end{aligned}$$

It can be shown that there is no other plan that yields a shorter time.