1228. Minimum Cost Tree From Leaf Values

Difficulty : Medium

https://leetcode.com/problems/minimum-cost-tree-from-leaf-values

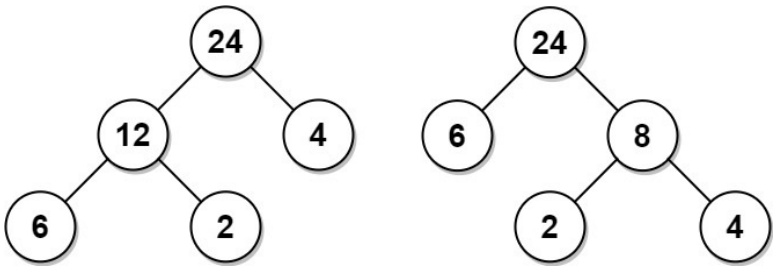
Given an array `arr` of positive integers, consider all binary trees such that:

- Each node has either `0` or `2` children;
- The values of `arr` correspond to the values of each **leaf** in an in-order traversal of the tree.
- The value of each non-leaf node is equal to the product of the largest leaf value in its left and right subtree, respectively.

Among all possible binary trees considered, return *the smallest possible sum of the values of each non-leaf node*. It is guaranteed this sum fits into a **32-bit** integer.

A node is a **leaf** if and only if it has zero children.

Example 1:

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Input: arr = [6,2,4]
Output: 32
Explanation: There are two possible trees shown.
The first has a non-leaf node sum 36, and the second has non-leaf node sum 32.
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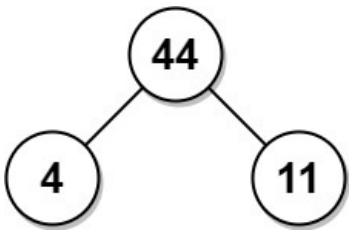
Example 2:




```
Input: arr = [4,11]
Output: 44
```

Constraints:

- `2 <= arr.length <= 40`
- `1 <= arr[i] <= 15`
- It is guaranteed that the answer fits into a **32-bit** signed integer (i.e., it is less than 2^{31}).