Sequence

Problem ID: sequence

A sequence of positive integers $(x_1, \ldots, x_m)$ is *good* if $x_1 = 1$ and for each $1 < j \leq m$ we have either $x_j = x_{j-1} + 1$ or $x_j = x_k \cdot x_l$ for some k and l with $0 < k \leq l < j$. For instance, the sequences $(1, 1)$ and $(1, 2)$ are both good, but the sequence $(1, 3)$ is not good. For n given integers $w_1, \ldots, w_n$ define the *weight* of an integer sequence $(x_1, \ldots, x_m)$ satisfying $1 \leq x_j \leq n$ for each $1 \leq j \leq m$ as

$$w_{x_1} + \cdots + w_{x_m} .$$

For instance, given the weights $w_1 = 10, w_2 = 42, w_3 = 1$, the weight of the sequence $(1, 1)$ is 20 and the weight of the sequence $(1, 3)$ is 11. For $1 \leq v \leq n$, define s_v as the smallest possible weight of a good sequence containing the value v.

Your task is to determine the values $s_1, \ldots, s_n$.

Input

The first line of input consists of the integer n, the number of weights. The next n lines contain the integer weights $w_1, \ldots, w_n$.

Output

Print n lines containing s_1, …, s_n in order.

Constraints and Scoring

We always have $1 \leq n \leq 30\,000$ and $1 \leq w_i \leq 10^6$ for each $1 \leq i \leq n$.

Your solution will be tested on a set of test groups, each worth a number of points. Each test group contains a set of test cases. To get the points for a test group you need to solve all test cases in the test group. Your final score will be the maximum score of a single submission.

Group	Points	Constraints
1	11	$n \leq 10$
2	10	$n \leq 300$, $w_1 = \cdots = w_n = 1$
3	10	$n \leq 300$, $w_1 = \cdots = w_n$
4	9	$n \leq 1400$, $w_1 = \cdots = w_n = 1$
5	45	$n \leq 5000$
6	15	*No additional constraints*

Sample Input 1	Sample Output 1
3 10 42 1	10 52 53