

Sequence

Problem ID: sequence

A sequence of positive integers (x_1, \dots, 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, \dots, w_n define the *weight* of an integer sequence (x_1, \dots, x_m) satisfying $1 \leq x_j \leq n$ for each $1 \leq j \leq m$ as

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

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, \dots, 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, \dots, w_n .

Output

Print n lines containing s_1, \dots, 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 | $n \leq 300, w_1 = \dots = w_n = 1$ |
| 3 | 10 | $n \leq 300, w_1 = \dots = w_n$ |
| 4 | 9 | $n \leq 1400, w_1 = \dots = w_n = 1$ |
| 5 | 45 | $n \leq 5000$ |
| 6 | 15 | <i>No additional constraints</i> |

Sample Input 1

3
10
42
1

Sample Output 1

10
52
53