A. Pride

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You have an array a with length n, you can perform operations. Each operation is like this: choose two **adjacent** elements from a, say x and y, and replace one of them with $gcd(x, y)$, where gcd denotes the greatest common divisor.

What is the minimum number of operations you need to make all of the elements equal to 1?

Input

The first line of the input contains one integer n $(1 \le n \le 2000)$ — the number of elements in the array.

The second line contains n space separated integers $a_1, a_2, ..., a_n$ $(1 \le a_i \le 10^9)$ — the elements of the array.

Output

Print -1, if it is impossible to turn all numbers to 1. Otherwise, print the minimum number of operations needed to make all numbers equal to 1.

Examples

input
5 2 2 3 4 6
output
5

input
4 2 4 6 8
output
-1

input
3 2 6 9
output
4

Note

In the first sample you can turn all numbers to 1 using the following 5 moves:

- $[2, 2, 3, 4, 6]$.
- $[2, 1, 3, 4, 6]$
- $[2, 1, 3, 1, 6]$
- $[2, 1, 1, 1, 6]$
- $[1, 1, 1, 1, 6]$
- $[1, 1, 1, 1, 1]$

We can prove that in this case it is not possible to make all numbers one using less than 5 moves.