An Animal Contest 5 P1 - Bamboo Cookies

Time Limit: 2.0s **Memory Limit:** 256M

Yasmar Nodrog is baking cookies to share between himself and his friend Larry the magical panda! Over the past few days, Yasmar baked N batches of cookies, with the i-th batch consisting of a_i cookies. Yasmar, being the good friend he is, will always share his cookies fairly with Larry. More specifically, Yasmar will repeat the following process until he cannot repeat it anymore:

> First he will select 2 batches of cookies to share with Larry. Then he will divide the cookies evenly between himself and Larry and remove all of the cookies from the chosen batches. Note that both Yasmar and Larry have extremely high standards and will only accept full cookies, meaning that it must be possible to divide the cookies in the chosen batches evenly.

Help Yasmar find the maximum number of times he can repeat this procedure!

Constraints

$1 \leq N \leq 2 \times 10^5$

$1 \leq a_i \leq 10^9$

Subtask 1 [25%]

$a_i = 2$

Subtask 2 [25%]

$a_i = 1$

Subtask 3 [25%]

$1 \leq N \leq 3$

Subtask 4 [25%]

No additional constraints.

Input Specification

The first line of input will consist of a single integer N.

The next and final line of input will contain N space-separated integers, denoting the number of cookies in each batch.

Output Specification

Output a single integer representing the maximum number of times Yamsar can repeat the procedure.

Sample Input 1

```
8
1 2 3 4 5 6 7 11
```

Sample Output 1

```
3
```

Explanation for Sample Output 1

A possible ordering of length 3 is $(1, 3), (5, 7), (2, 4)$, where (x, y) means that you choose the cookie batches with x cookies and y cookies. It can be proven that you cannot perform the operation more than 3 times.

Sample Input 2

```
4
1 2 3 4
```

Sample Output 2

```
2
```

An Animal Contest 5 P2 - Permutations & Products

Time Limit: 3.0s **Memory Limit:** 256M

Larry the magical panda is bored of eating bamboo cookies, so he challenges you to a game. He has a permutation of $1, 2, \ldots, N$ which he calls A, and you have to guess the permutation by asking questions. The questions work as follows:

- You will give Larry two distinct indices i and j $(1 \leq i, j \leq N, i \neq j)$
- Larry will respond with the result of $A_i \times A_j$

Larry allows you to ask at most $N - 1$ questions. Can you guess the permutation and win the game?

Constraints

$3 \leq N \leq 10^5$

Subtask 1 [10%]

$N = 3$

Subtask 2 [90%]

No additional constraints.

Interaction

This is an interactive problem, where you and the judge exchange information back-and-forth to solve the problem.

At first, you should read in a line containing the integer N.

You will then start the interaction by proceeding with your questions. Each question should be formatted as `? i j` followed by a `\n` character, with $1 \leq i, j \leq N$ and $i \neq j$. In response, you will be given $A_i \times A_j$ on its own line.

If you believe you have the solution, you may output `!` followed by a space-separated list of N integers $A_1, A_2, \ldots, A_N$, the permutation A. You must terminate your program immediately after performing this operation. Note that this operation does not count towards the limit of $N - 1$ questions.

If at any point you attempt an invalid question (such as an invalid output format or a prohibited pair of indices), or you exceed the limit of $N - 1$ questions, the interactor will respond with -1. You should terminate your program immediately after receiving this feedback to receive a Wrong Answer verdict, or you may receive an arbitrary verdict. If the final list you output is incorrect, you will receive a Wrong Answer verdict. Otherwise, you will receive a verdict of Accepted for the corresponding test case.

Please note that you may need to flush `stdout` after each operation, or interaction may halt. In C++, this can be done with `fflush(stdout)` or `cout << flush` (depending on whether you use `printf` or `cout`). In Java, this can be done with `System.out.flush()`. In Python, you can use `sys.stdout.flush()`.

Sample Interaction

`>>>` denotes your output. Do not print this out.

```
5
>>> ? 4 5
5
>>> ? 2 4
3
>>> ? 2 3
6
>>> ! 4 3 2 1 5
```