Distance

Type	Input file	Output file	Time limit	Memory limit
Batch	stdin	stdout	1 second	128 MB

Statement

You live on a street with $2L$ houses, which are numbered from 1 to $2L$. As with other streets odd numbered houses are on the left side, and even numbered houses are on the right side. House 1 is directly opposite of house 2, and house 3 is directly opposite of house 4 and so on. You just live in house 1 and wish to get to the park at the other end of your street (past house $2L - 1$ or $2L$).

At any time while walking, you may cross the road directly or walk to the block(s) directly adjacent to your current position. Formally, if you are currently in front of house i you can go directly to houses $i - 2$, $i + 2$ or the house opposite to house i.

However, your neighbours be out on the front garden, and in times like this you must try to stay away from them! We say that you maintain social distance K during the walk if at any time you remain at least K houses away from any neighbour on the same side of the street as your current position at all times. During the afternoon, N people come out for gardening, the ith being the the resident of house h_i. After each person comes out for gardening, calculate the maximum social distance you can maintain if you were to go for a walk. No resident comes out twice, and no one goes home.

Input

The first line contains 2 integers N L. The next line contains N distinct integers h_1 ... h_N.

Output

Output N integers on 1 line, the ith being the maximum social distance you can maintain after the ith event. If you can avoid ever having people out gardening on the same side of road as you , output -1.

Sample Input

```
4 8
16 7 4 3
```

Sample Output

```
-1 2 1 0
```

Explanation

- After the first person comes out you can stay on the left side of the road without having anyone on the same side of road as yourself. Hence the answer is -1.

- After the second person you can start at house 1, cross to house 2, walk to house 12, cross to house 11, and walk to the end of the road past house 15. The minimum social distance is therefore 2.

- After the 4th person it is inevitable that you must pass house 3 or 4, therefore the answer is 0.

Scoring

For each test case, your program shall be awarded 100% of the marks if the correct answer is written, and 0% otherwise.

Constraints

- $1 \leq N \leq 10^5$

- $1 \leq L \leq 10^9$

- $1 \leq N < 2L$

- $2 \leq h_i \leq 2L$ for all i

Subtasks

Number	Points	Max N	Other Constraints
1	20	10^3	$L \leq 10^3$
2	30	10^3	$L \leq 10^5$
3	30	10^5	$L \leq 10^5$
4	20	10^5	None