Problem G
Mex XOR

You initially have an empty set S, and an integer K. You will then have to process Q queries, each giving you an integer X, meaning that you will have to **insert** X into S if $X \notin S$, or **remove** X from S if $X \in S$.

After each query, you would like to know the following. Find the minimum of MEX$(\{s \oplus i : s \in S\})$ for all $0 \leq i \leq K$.

The operator $\oplus$ is the bitwise XOR operation, while MEX is a function that returns the smallest non-negative integer that does not appear in the set. In particular, the MEX of an empty set is 0.

Input

The first line contains two integer Q and K ($1 \leq Q \leq 200\,000$; $0 \leq K < 2^{30}$).

Each of the next Q lines contains an integer X ($0 \leq X < 2^{30}$).

Output

Output Q lines, representing the minimum MEX value after each query.

Sample Input 1	Sample Output 1
4 2 1 0 2 1	0 0 1 0

Explanation of Sample 1: After the first query, the set S is $\{1\}$. We can see that MEX$(\{1 \oplus 0\}) = 0$, and this is the minimum possible value.

After the third query, the set S is $\{0, 1, 2\}$. The values to consider are as follows:

- MEX$(\{0 \oplus 0, 1 \oplus 0, 2 \oplus 0\}) =$ MEX$(\{0, 1, 2\}) = 3$.
- MEX$(\{0 \oplus 1, 1 \oplus 1, 2 \oplus 1\}) =$ MEX$(\{1, 0, 3\}) = 2$.
- MEX$(\{0 \oplus 2, 1 \oplus 2, 2 \oplus 2\}) =$ MEX$(\{2, 3, 0\}) = 1$.

The minimum among them is 1.

After the fourth query, the set S is $\{0, 2\}$ and MEX$(\{0 \oplus 1, 2 \oplus 1\}) = 0$.

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