Problem C. Bladestorm

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	1024 megabytes

In Hearthstone, *Bladestorm* is a strong warrior-class spell card, as shown below. Its effect is to deal one damage to all minions until one minion dies.



In real-game situations, Bladestorm itself cannot deal with complicated boards, so it is usually used together with some other area-of-effect spells. Now Bobo is playing the warrior class in Hearthstone, and his opponent plays minions with **pairwise distinct** health points $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le n$) sequentially. Bobo has an infinite amount of Bladestorm and spells that can deal k damages to all minions, and we assume that he may play arbitrary of them in any order. He wonders, each time the opponent plays a minion, what is the minimum number of spells he needs to play to remove all minions on board?

Formally, for each $i = 1, 2, \ldots, n$, let $S_i = \{a_1, a_2, \ldots, a_i\}$ be the set including the health points of the first i minions. Bobo wants to compute ans_i, which is the minimum number of the following operations to perform to make S_i empty:

- *Play Bladestorm.*
  1. Set $x \leftarrow x - 1$ for each $x \in S_i$
  2. If S_i contains at least one 0, erase all 0s in S_i and end this operation. Otherwise, goto step 1.
- *Play a normal area of effect.* Set $x \leftarrow x - k$ for each $x \in S_i$ and erase all elements not greater than 0 in S_i.

Input

This problem contains multiple test cases. The first line of input contains an integer T ($1 \le T \le 50\,000$), denoting the number of test cases.

For each test case, the first line of input contains two integers n, k ($1 \le k \le n \le 10^5$), denoting the number of minions your opponent plays and the damage of the normal area-of-effect.

Then, one line containing n **pairwise distinct** integers $a_1, a_2, \ldots, a_n$ $(1 \le a_i \le n)$ follows, denoting the health of each minion the opponent plays sequentially.

It is guaranteed that the sum of n over all test cases does not exceed $5 \cdot 10^5$.

Output

For each test case, output n integers $\text{ans}_1, \text{ans}_2, \ldots, \text{ans}_n$ in one line, where the i-th $(1 \le i \le n)$ integer denotes the minimum number of spells Bobo needs to play to remove all minions on board after the opponent plays the first i minions.

Example

standard input	standard output
3 7 2 4 7 3 6 1 2 5 11 3 10 7 4 9 6 8 5 1 3 2 11 9 2 1 2 3 7 8 9 4 5 6	1 2 3 3 4 4 4 1 2 3 3 3 3 3 4 4 4 4 1 1 2 3 4 4 4 5 5