

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 $a_1, a_2, \dots, a_n$ ($1 \leq a_i \leq n$) 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 $i = 1, 2, \dots, n$, let $S_i = \{a_1, a_2, \dots, a_i\}$ 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 ($1 \leq T \leq 50\,000$), denoting the number of test cases.

For each test case, the first line of input contains two integers n, k ($1 \leq k \leq n \leq 10^5$), 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 $a_1, a_2, \dots, a_n$ ($1 \leq a_i \leq n$) 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 $\text{ans}_1, \text{ans}_2, \dots, \text{ans}_n$ in one line, where the i -th ($1 \leq i \leq n$) 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	1 2 3 3 4 4 4
7 2	1 2 3 3 3 3 3 4 4 4 4
4 7 3 6 1 2 5	1 1 2 3 4 4 4 5 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	