Sort the Students 2

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

Note : This is the harder version of the same question with no limits on inversions.

There are n students standing in a straight line, but the physical education teacher notices that they are not in increasing order of their heights. The teacher wants the students to shift their places so that they are in increasing order of their height from left (0 Index) to right .

But now the physical education teacher needs your help to do this. The way you do this is that you find the first student whose height is smaller than the student's height before him and shift him backwards(towards left) till he reaches the position where the student before him is of smaller or of equal height. However the effort it takes you to move that student to the correct position is equal to the sum of the heights of the students you moved them through.

Find the total effort it takes to sort all the students in increasing order of their heights.

Input

The first line contains an integer n denoting the number of students $(1 \leq n \leq 10^5)$

The second line contains n space separated numbers, the height of the students. $(1 \leq A[i] \leq 10000)$

Output

Output a single Integer as the answer

Example

standard input	standard output
5 1 6 7 8 2	21