

PROBLEM GROW GRAVITY

LITTLE NEWTON likes gravity and plays with a magical shape made out of 1×1 squares, suspended in the air.

Initially, this shape is made of only one such square. On this magical shape two things happen (in this order):

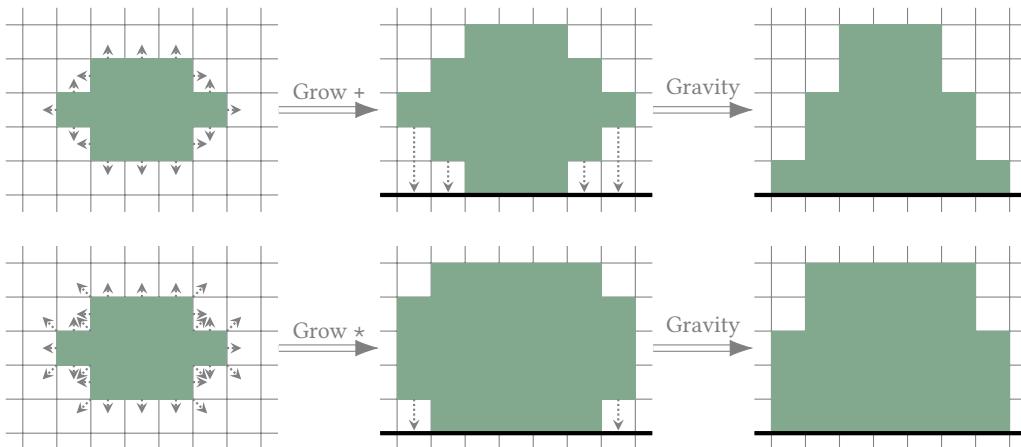
1. Grow phase: Around each square in this shape some new squares will appear. The grow phase can be of two types:

Type $+$. The new squares will appear around the squares in only 4 directions (north, south, east and west).

Type $*$. The new squares will appear in 8 directions (north, south, east, west, north-east, north-west, south-east and south-west).

2. Gravity phase: In this phase, LITTLE NEWTON places a plate under the shape and lets all the squares fall onto it. Note: The plate is removed immediately after this operation!

As an example, the effects of each of the 2 types of grow phases, followed by a gravity phase, are pictured below.



LITTLE NEWTON has an array v_1, \dots, v_N of N types of grow phases and wants to do Q operations of the following types:

- update(i): If $v_i = +$ then set it to $*$; otherwise if $v_i = *$ set it to $+$.
- query(ℓ, r): Suppose LITTLE NEWTON starts with a shape made out of only one 1×1 square and applies, for $i = \ell, \dots, r$, in order, a grow phase of type v_i followed by a gravity phase. How many 1×1 squares will the shape have in the end?

Help LITTLE NEWTON answer all of these queries.

INPUT DATA The first line of the input contains the number N . The second line contains N symbols from among $\{+, *\}$, not separated by spaces, representing the initial values of v_1, \dots, v_N . The third line of the input contains the number Q . Then, each of the following Q lines will contain one of the following: either two integers $1 \ i$ representing an update(i) operation, or three integers $2 \ \ell \ r$ representing a query(ℓ, r) operation.

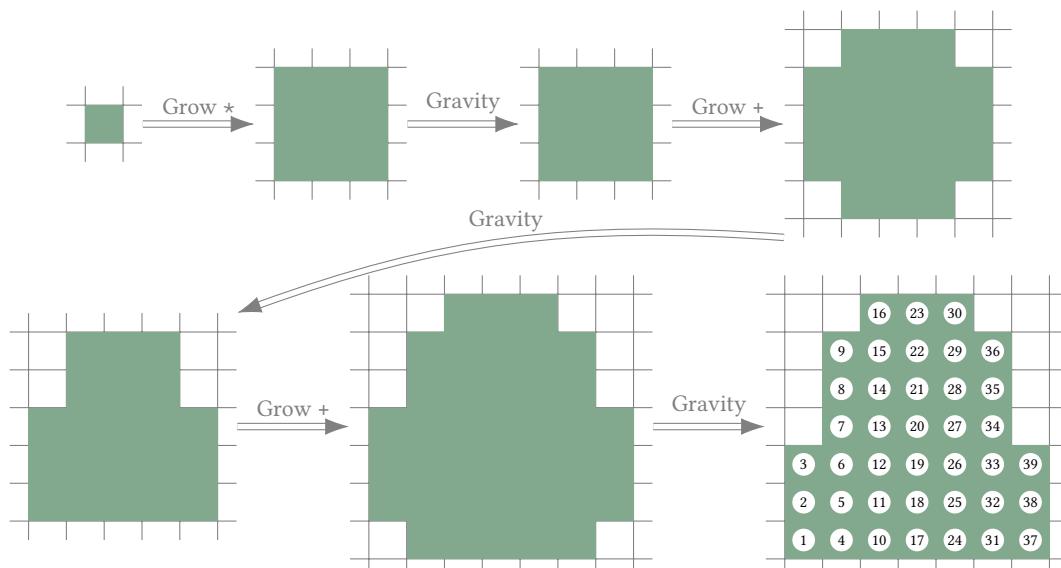
- **OUTPUT DATA** You should output the answer for each query (ℓ, r) operation, each on a new line.
- **RESTRICTIONS**
 - ◆ $1 \leq N \leq 200\,000$.
 - ◆ $1 \leq Q \leq 200\,000$.
 - ◆ $v_i \in \{+, *\}$ for $1 \leq i \leq N$.
 - ◆ $t \in \{1, 2\}$, $1 \leq i \leq N$ and $1 \leq \ell \leq r \leq N$ for each operation.

#	Points	Constraints
1	5	$v_i = *$ for each $1 \leq i \leq N$ and the operations are only of type 2.
2	10	$1 \leq N \leq 40$ and $1 \leq Q \leq 40$.
3	20	$1 \leq N \leq 300$ and $1 \leq Q \leq 300$.
4	30	$v_i = +$ for each $1 \leq i \leq N$ and the operations are only of type 2.
5	35	No further restrictions.

Input data	Output data
4	39
****	49
9	31
2 2 4	
1 3	
1 4	
2 2 4	
1 1	
1 2	
1 3	
1 4	
2 2 4	

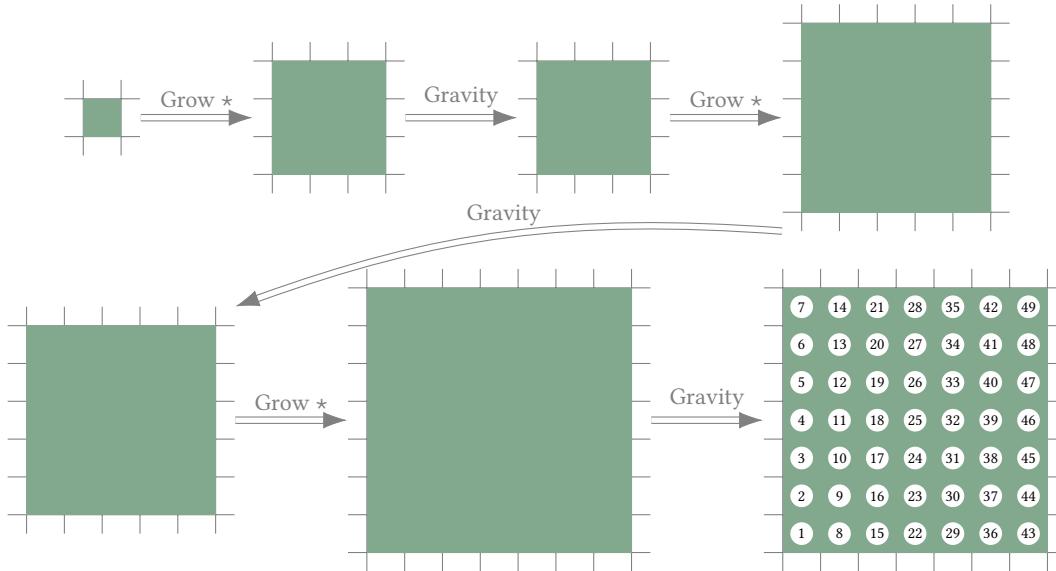
■ EXPLANATIONS

First query. In this query, the sequence of operations is $***$. The shape thus has the following configurations.



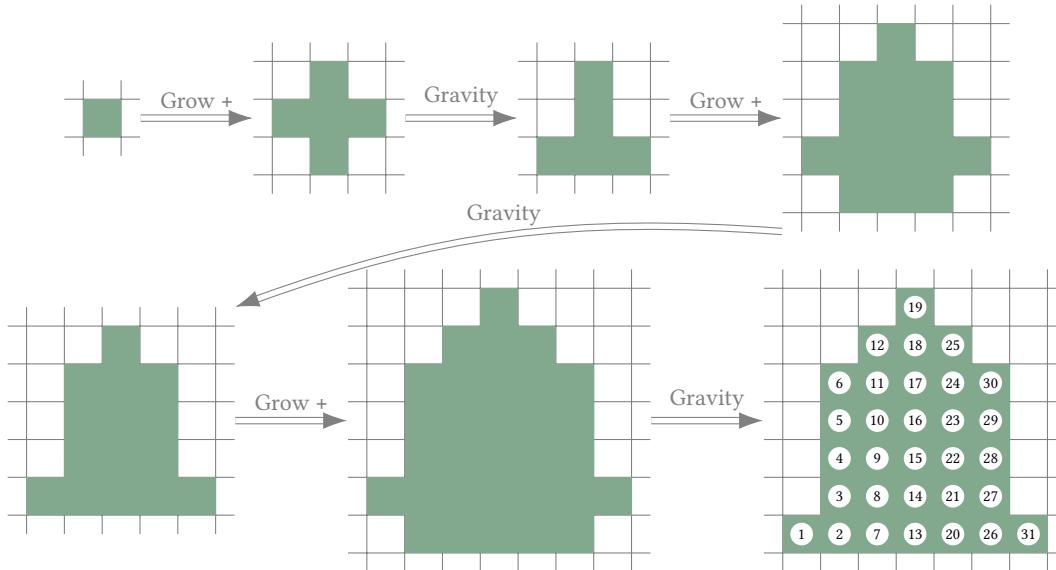
Hence the answer is 39.

Second query. In the second query, the sequence of operations is *******. The shape thus has the following configurations.



Therefore, the answer is 49.

Third query. In the last query, the sequence of operations is **+++**. The shape thus has the following configurations.



Thus, the answer is 31.