Ada and Furrows

As you might already know, Ada the Ladybug is a farmer. She has multiple furrows in which she grows vegetables. She also never grows multiple vegetables of the same kind in the same furrow. Ada sometime palnts a new vegetable, harveest a vegetable or asks for some aspect which two different furrows have in common (described in input).

Input

The first line of input will contain **$1 \leq Q \leq 3*10^5$**, the number of queries.

Each of the next **Q** lines will contain **? x y**: **$0 \leq x, y \leq 2*10^4$**, and **?** is one of: **+ - v ^ !** \ with following meaning:

+: Plants vegetable of kind **y** to furrow number **x** (note that there will never be multiple vegetables of the same kind in the same furrow)

-: Harvests vegetable of kind **y** from furrow number **x** (note that there will always be a vegetable of that kind)

v: Finds out how many kinds of vegetables there are in furrows **x** and **y**.

^: Finds out how many kinds of vegetable are in both furrows (**x, y**)

!: Find out how many kinds of vegetables are in **x** and **y BUT** not in both of them at once.

\: Find out how many kinds of vegetable are in **x** but not in **y**

Output

For each query of the last four kinds, output the proper answer.

Example Input

```
10
+ 1 4
! 0 2
+ 0 2
\ 0 2
^ 0 1
v 2 0
+ 2 4
! 2 0
+ 1 0
! 0 2
```

Example Output

```
0
1
0
1
2
```

2

Example Input

```
15
+ 0 2
! 0 1
+ 1 1
v 0 1
+ 1 2
! 1 0
! 0 1
+ 0 0
v 0 1
^ 0 1
+ 1 3
\ 1 0
\ 1 0
+ 1 0
- 1 2
```

Example Output

```
1
2
1
1
3
1
2
2
```

Example Input

```
10
+ 2 1
! 3 1
! 3 1
+ 1 1
\ 2 0
+ 3 1
v 2 3
! 2 3
- 1 1
^ 1 2
```

Example Output

```
0
0
1
1
0
0
```