

## NOP

Examine the program sequentially from left to right. If an instruction (capital letter) is at an address not divisible by 4, then we need to add NOP instructions just before it until the address becomes divisible by 4.

It is possible to literally add characters into the program string, but not necessary. It suffices to keep track of the number of inserted NOP instructions; the actual address of any instruction is its original address plus the number of NOP instructions inserted before it.

## CIJEVI

First write four auxiliary functions `left(r,c)`, `right(r,c)`, `up(r,c)` and `down(r,c)` telling us if gas can flow in each direction from empty cell `(r,c)`. For example, the function `left(r,c)` can look like this:

```
return true if Map(r,s-1) = '+' or Map(r,s-1) = '-' or Map(r,s-1) = '1' or Map(r,s-1) = '2'
```

The task can be solved in one pass through the map. For every empty cell `(r, c)` we run the following checks:

```
if left(r,c) and right(r,c) and up(r,c) and down(r,c) then output r c '+'
else if left(r,c) and right(r,c) then output r c '-'
else if up(r,c) and down(r,c) then output r c '|'
else if right(r,c) and down(r,c) then output r c '1'
else if right(r,c) and up(r,c) then output r c '2'
else if left(r,c) and up(r,c) then output r c '3'
else if left(r,c) and down(r,c) then output r c '4'
```

## ROBOTI

All this task requires is carefully implementing the described behaviours of the player and robots.

Before each move the player makes, we initialise an auxiliary board to contain '.' in every cell.

From the player's next move we calculate his new position and put 'I' into the appropriate cell in the auxiliary board. If the same cell in the "real" board contains the letter 'R' then the game is over.

Next we search the real board for the letter 'R', calculate where the robot moves, and then:

- If the same cell in the auxiliary table contains the letter 'I' then the game is over.
- If the same cell in the auxiliary table is '.' then overwrite it with 'R'.
- Otherwise, there are already robots in the cell so overwrite it with 'X' denoting a collision and imminent explosion.

Finally, before the next move, replace all occurrences of the letter 'X' with '.' and copy the auxiliary board onto the real board.

## RELJEF

The task asks us to simulate the stick fight.

In every step, find the chunk of mineral that the thrown stick hits, delete it and check for any clusters floating in the air. If there is a floating cluster, we need lower all the chunks it contains until one of the chunks lands on the ground or another cluster. Clusters can be found using breadth-first search (BFS) or depth-first search (DFS).