Problem 2

You are playing a game and your goal is to collect 100 coins.

On the first line, you will be given a **number** representing the **size of the field** with **square** shape. On the next few lines, you will be given a **field** with:

- **One player** randomly placed in it and marked with symbol **"P"**
- **Numbers** for coins placed at different positions of the field
- **Walls** marked with **"X"**.

After the field state, you will be given **commands** for the **players movement**. Commands can be: **"up"**, **"down"**, **"left"**, **"right"**. If the command is invalid, you should ignore it.

If the player **goes out** of the field **or** he **hits a wall**, he **loses the game** and **his coins are reduced to 50% and rounded down** to the next-lowest number. The program ends.

Otherwise, the player has to collect **at least 100 coins** to win the game.

For more clarifications see the examples below.

Input

- **Number** representing the size of the field (matrix NxN)
- **Matrix** representing the field (each position **separated by single space**)
- On each of the next lines you will get a move command.

Output

- If the player won the game, print: **"You won! You've collected {total_coins} coins."**
- If the player loses the game, print: **"Game over! You've collected {total_coins} coins."**
- Collected coins have to be **rounded down** to the next-lowest number.
- The field **positions** from which the player has **collected coins as lists:**

```
"Your path:
[{row_position1}{column_position1}]
[{row_position2}{column_position2}]
[{row_position3}{column_position3}]
..."
```

Constrains

- There will be no case in which in the field will be less than 100 coins.
- All of the given numbers will be valid integers in the range [0, 100].

Examples

Input	Output
5 1 X 7 9 11 X 14 46 62 0 15 33 21 95 X P 14 3 4 18 9 20 33 X 0 right right up up left down	You won! You've collected 131 coins. Your path: [3, 1] [3, 2] [2, 2] [1, 2] [1, 1] [2, 1]
8 13 18 9 7 24 41 52 11 54 21 19 X 6 4 75 6 76 5 7 1 76 27 2 37 92 3 25 37 52 X 56 72 15 X 1 45 45 X 7 63 1 63 P 2 X 43 5 1 48 19 35 20 100 27 42 80 73 88 78 33 37 52 X 22 up left	Game over! You've collected 0 coins. Your path: [4, 2]