



USACO 2021 DECEMBER CONTEST, PLATINUM PROBLEM 2. PAIRED UP

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English (en) ▾

There are a total of N ($1 \leq N \leq 5000$) cows on the number line, each of which is a Holstein or a Guernsey. The breed of the i -th cow is given by $b_i \in \{H, G\}$, the location of the i -th cow is given by x_i ($0 \leq x_i \leq 10^9$), and the weight of the i -th cow is given by y_i ($1 \leq y_i \leq 10^9$).

At Farmer John's signal, some of the cows will form pairs such that

- Every pair consists of a Holstein h and a Guernsey g whose locations are within K of each other ($1 \leq K \leq 10^9$); that is, $|x_h - x_g| \leq K$.
- Every cow is either part of a single pair or not part of a pair.
- The pairing is *maximal*; that is, no two unpaired cows can form a pair.

It's up to you to determine the range of possible sums of weights of the unpaired cows. Specifically,

- If $T = 1$, compute the minimum possible sum of weights of the unpaired cows.
- If $T = 2$, compute the maximum possible sum of weights of the unpaired cows.

INPUT FORMAT (input arrives from the terminal / stdin):

The first input line contains T , N , and K .

Following this are N lines, the i -th of which contains b_i, x_i, y_i . It is guaranteed that $0 \leq x_1 < x_2 < \dots < x_N \leq 10^9$.

OUTPUT FORMAT (print output to the terminal / stdout):

The minimum or maximum possible sum of weights of the unpaired cows.

SAMPLE INPUT:

```
2 5 4
G 1 1
H 3 4
G 4 2
H 6 6
H 8 9
```

SAMPLE OUTPUT:

```
16
```

Cows 2 and 3 can pair up because they are at distance 1, which is at most $K = 4$. This pairing is maximal, because cow 1, the only remaining Guernsey, is at distance 5 from cow 4 and distance 7 from cow 5, which are more than $K = 4$. The sum of weights of unpaired cows is $1 + 6 + 9 = 16$.

SAMPLE INPUT:

```
1 5 4
G 1 1
H 3 4
G 4 2
H 6 6
H 8 9
```

SAMPLE OUTPUT:

6

Cows 1 and 2 can pair up because they are at distance $2 \leq K = 4$, and cows 3 and 5 can pair up because they are at distance $4 \leq K = 4$. This pairing is maximal because only cow 4 remains. The sum of weights of unpaired cows is the weight of the only unpaired cow, which is simply 6.

SAMPLE INPUT:

```
2 10 76
H 1 18
H 18 465
H 25 278
H 30 291
H 36 202
G 45 96
G 60 375
G 93 941
G 96 870
G 98 540
```

SAMPLE OUTPUT:

1893

The answer to this example is $18 + 465 + 870 + 540 = 1893$.

SCORING:

- Test cases 4-7 satisfy $T = 1$.
- Test cases 8-14 satisfy $T = 2$ and $N \leq 300$.
- Test cases 15-22 satisfy $T = 2$.

****Note: the memory limit for this problem is 512MB, twice the default.****

Problem credits: Benjamin Qi

Contest has ended. No further submissions allowed.