A -- GCD LCM

The GCD of two positive integers is the largest integer that divides both the integers without any remainder. The LCM of two positive integers is the smallest positive integer that is divisible by both the integers. A positive integer can be the GCD of many pairs of numbers. Similarly, it can be the LCM of many pairs of numbers. In this problem, you will be given two positive integers. You have to output a pair of numbers whose GCD is the first number and LCM is the second number.

Input

The first line of input will consist of a positive integer T. T denotes the number of cases. Each of the next T lines will contain two positive integers, G and L

Output

For each case of input, there will be one line of output. It will contain two positive integers a and b, a <= b, which has a GCD of G and LCM of L. In case there is more than one pair satisfying the condition, output the pair for which a is minimized. In case there is no such pair, output `-1'.

Constraints

- T <= 100
- Both G and L will be less than 2^{31}

Sample Input

```
2
1 2
3 4
```

Sample Output

```
1 2
-1
```

B - Yaroslav and Time

Yaroslav is playing a game called "Time". The game has a timer showing the lifespan he's got left. As soon as the timer shows 0, Yaroslav's character dies and the game ends. Also, the game has n clock stations, station number i is at point (x_i, y_i) of the plane. As the player visits station number i, he increases the current time on his timer by a_i. The stations are for one-time use only, so if the player visits some station another time, the time on his timer won't grow.

A player spends $d \cdot dist$ time units to move between stations, where *dist* is the distance the player has covered and d is some constant. The distance between stations i and j is determined as $|x_i - x_j| + |y_i - y_j|$.

Initially, the player is at station number 1, and the player has strictly more than zero and strictly less than one units of time. At station number 1 one unit of money can increase the time on the timer by one time unit (you can buy only integer number of time units).

Now Yaroslav is wondering, how much money he needs to get to station n. Help Yaroslav. Consider the time to buy and to increase the timer value negligibly small.

Input

The first line contains integers n and d ($3 \leq n \leq 100$, $10^3 \leq d \leq 10^5$) — the number of stations and the constant from the statement.

The second line contains $n - 2$ integers: $a_2, a_3, \ldots, a_{n-1}$ ($1 \leq a_i \leq 10^3$). The next n lines contain the coordinates of the stations. The i-th of them contains two integers x_i, y_i ($-100 \leq x_i, y_i \leq 100$).

It is guaranteed that no two stations are located at the same point.

Output

In a single line print an integer — the answer to the problem.

Sample Input

Input
```
3 1000
1000
0 0
0 1
0 3
```
Output
```
2000
```
Input
```
3 1000
1000
1 0
1 1
1 2
```
Output
```
1000
```

C – Bridge

n people wish to cross a bridge at night. A group of at most two people may cross at any time, and each group must have a flashlight. Only one flashlight is available among the n people, so some sort of shuttle arrangement must be arranged in order to return the flashlight so that more people may cross. Each person has a different crossing speed; the speed of a group is determined by the speed of the slower member. Your job is to determine a strategy that gets all n people across the bridge in the minimum time.

Input

The first line of input contains n, followed by n lines giving the crossing times for each of the people. There are not more than 1000 people and nobody takes more than 100 seconds to cross the bridge.

Output

The first line of output must contain the total number of seconds required for all n people to cross the bridge. The following lines give a strategy for achieving this time. Each line contains either one or two integers, indicating which person or people form the next group to cross. (Each person is indicated by the crossing time specified in the input. Although many people may have the same crossing time the ambiguity is of no consequence.) Note that the crossings alternate directions, as it is necessary to return the flashlight so that more may cross. If more than one strategy yields the minimal time, any one will do.

Sample Input

4
1
2 > 1
5 > 1
10 > 1

10 + 5 + 2

1 2

1 10 ~~10 + 1 + 5 + 1 + 2~~

1
5 1
1
1 2

Sample Output

17
1 2
1
5 10
2
1 2

2 + 1 + 10 + 2 + 2

n = 1 Light

2 <=

1

Speed

1

Sort

5, 4 3 7, 10

5 7

3, 14

1,

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D - Lonesome Knight

The statement of this problem is very simple: you are to determine how many squares of the chessboard can be attacked by a knight standing alone on the board. Recall that a knight moves two squares forward (horizontally or vertically in any direction) and then one square sideways (perpendicularly to the first direction).

Input

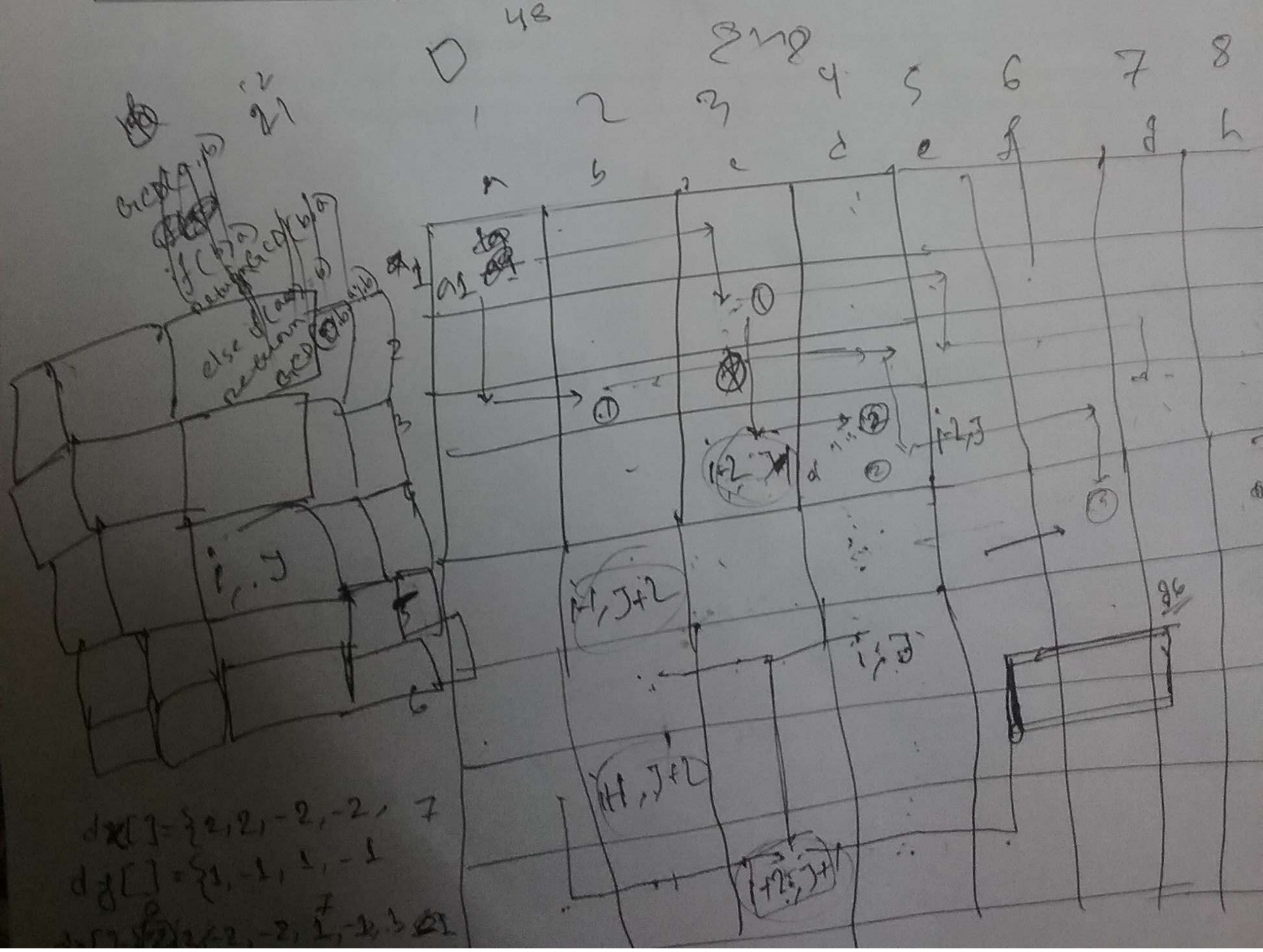
The first line contains the number N of test cases, $1 \leq N \leq 100$. Each of the following N lines contains a test: two characters. The first character is a lowercase English letter from 'a' to 'h' and the second character is an integer from 1 to 8; they specify the rank and file of the square at which the knight is standing.

Output

Output N lines. Each line should contain the number of the squares of the chessboard that are under attack by the knight.

Sample Input

input	output
3 a1 d4 g6	2 8 6

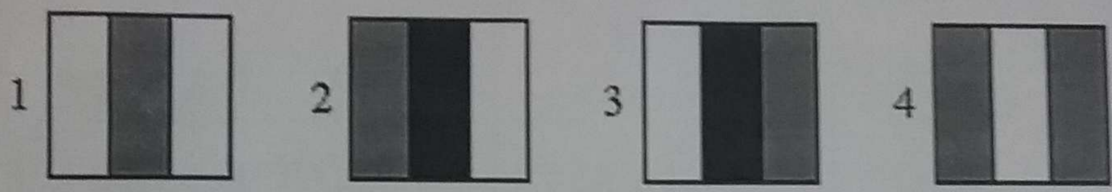


E – Flags

On the Day of the Flag of Russia a shop-owner decided to decorate the show-window of his shop with textile stripes of white, blue and red colors. He wants to satisfy the following conditions:

1. Stripes of the same color cannot be placed next to each other.
2. A blue stripe must always be placed between a white and a red or between a red and a white one.

Determine the number of the ways to fulfill his wish.
Example. For $N = 3$ result is following:



Input

N, the number of the stripes, $1 \leq N \leq 45$.

Output

M, the number of the ways to decorate the shop-window.

Sample Input

input	output
3	4

white
blue
red

2
2

W B R
R B W

W

1 — 3

2 — RB

WB
BW — 2

WB
RW

W R W — 4