IOI & EGOI Team Selection Test

2025

The Return of the Quantum Cows!

Time limit: 4 seconds	**Memory limit: 768 MB**

After a long battle (which only lasted 2 hours...), Mina finally managed to weaken the powerful Dox Taurus cows, transforming them into Funas Taurus cows – a much weaker version that can only move one cell at a time. To move a cow by one cell, Mina must feed it one qubit.

Mina's goal is to gather all the C cows into the same cell of an $m \times n$ grid using the **minimum number of qubits**. However, due to brain damage caused by AOI, Mina can only see one cow at a time. Each time she sees a new cow, she recalculates the minimum number of qubits required to gather **all the cows seen so far** into a single cell.

Task

Given the coordinates of the cows in the order Mina sees them, determine the number of qubits Mina computes at each step, and print these numbers one by one.

Input

A single line containing three integers: `n`, `m`, and `C`-the grid dimensions and the number of cows, with $1 \leq n, m \leq 10^6$ and $1 \leq C \leq 10^5$.
C lines follow, each containing two integers x_i and y_i, representing the coordinates of the i-th cow seen by Mina.

Output

Output C lines. On the i-th line, print the number of qubits Mina computes after seeing the first i cows.

Subtasks

Subtask	Score	Constraints
1	5	$n = 1, m = 2$
2	15	$n, m, C \leq 100$
3	30	$n, m, C \leq 1000$
4	50	No further constraints

Example

Input

```
5 5 3
1 1
2 3
5 5
```

Output

```
0
3
8
```