# Waterloo 2017 Winter E - Vera and Love Triangles

**Time limit:** 1.0s    **Memory limit:** 256M

**2017 Winter Waterloo Local ACM Contest, Problem E**

Vera has $N$ friends numbered from 0 to $N - 1$. Being in Software Engineering, all her friends do not have enough spare time to engage in relationships. However, friends have crushes on each other.

If $x$ is a non-negative integer, let $g(x)$ be the number of ones in the binary representation of $x$.

Let $f(i, j) = g((A \cdot B^{i \cdot N + j}) \% M)$, where $A, B, M$ are integer constants.

It is known that for any 2 friends $i$ and $j$ where $i < j$, if $f(i, j)$ is even then $i$ has a crush on $j$, otherwise $j$ has a crush on $i$.

Vera thinks love triangles are very funny. A *love triangle* is a set of 3 friends $i, j, k$ such that $i$ has a crush on $j$, $j$ has a crush on $k$ and $k$ has a crush on $i$.

Given integers $N, M, A, B$ tell Vera how many love triangles exist among her friends. Two love triangles are different if they contain a different set of 3 friends.

## Constraints

- $3 \le N, M \le 200\,000$
- $0 < A, B < M$
- $N, M, A, B$ are integers
- $M$ is prime

## Input Specification

The input will be in the format:

$N\ M\ A\ B$

## Output Specification

Output one line with the number of love triangles.

## Sample Input 1

```
3 5 3 4
```

## Sample Output 1

```
1
```

## Explanation of Sample Output 1

Let $a \to b$ denote that friend $a$ has a crush on friend $b$.

We have $f(0, 1) = 1$, $f(0, 2) = 2$, and $f(1, 2) = 1$. So $0 \to 2$, $2 \to 1$, and $1 \to 0$, so there is one love triangle.

## Sample Input 2

```
3 3 1 2
```

## Sample Output 2

```
0
```

## Explanation of Sample Output 2

We have $1 \to 0$, $2 \to 0$, and $2 \to 1$, so there are zero love triangles.

## Sample Input 3

```
1337 10007 1337 1337
```

## Sample Output 3

```
99141170
```