Problem C
Chemistry Experiment
Time Limit: 3 Seconds

The International Chemical Protection Council (ICPC) enforces strict safety regulations in chemical laboratories: direct contact between different chemicals may trigger hazardous reactions, so a neutralizing agent must always be placed between them.

A laboratory has a row of n containment compartments, indexed from 1 to n. Each compartment must be filled with one of the following:

- One of k distinct chemical substances, labeled with integers from 1 to k.
- A neutralizing agent, labeled with the integer 0.

In this experiment, all k chemical substances must be utilized. Therefore, for every integer x from 1 to k, the chemical substance x **must be placed in at least one compartment**.

Let A_i denote the label of the chemical substance in compartment i, or 0 if the compartment contains the neutralizing agent. The resulting sequence is $A = (A_1, A_2, \ldots, A_n)$.

According to ICPC safety regulations, two adjacent compartments cannot contain different nonzero chemical substances. Formally, for every $1 \le i < n$, if $A_i \neq 0$ and $A_{i+1} \neq 0$, then $A_i = A_{i+1}$.

Given the integers n, k, and m, find the number of valid sequences A that satisfy all the conditions above, modulo m.

Input
Your program is to read from standard input. The first and only line of the input contains three space-separated integers n, k, and m ($1 \le k \le 5 \times 10^5$; $k \le n \le 10^9$; $10^8 < m < 10^9$; m is a prime number).

Output
Your program is to write to standard output. Print exactly one line. The line should contain the number of valid sequences modulo m.

The following shows the sample input and output for four test cases.

Sample Input 1	Output for the Sample Input 1
3 2 998244353	2

Sample Input 2	Output for the Sample Input 2
4 2 993244853	10

Sample Input 3	Output for the Sample Input 3
500000 123456 100000007	43861600

Sample Input 4	Output for the Sample Input 4
314159 265358 265531103	0