# 4387 Tower

Alan loves to construct the towers of building bricks. His towers consist of many cuboids with square base. All cuboids have the same height $h = 1$. Alan puts the consecutive cuboids one over another:

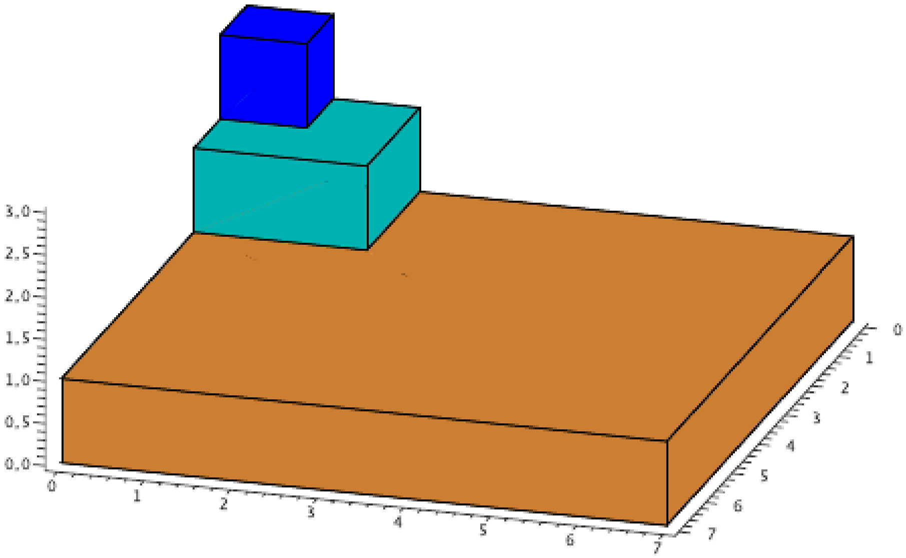

Figure 1: Tower of three bricks when Alan fixes $a_2 = 2$.

Recently in math class, the concept of volume was introduced to Alan. Consequently, he wants to compute the volume of his tower now. The lengths of cuboids bases (from top to bottom) are constructed by Alan in the following way:

1. Length $a_1$ of the first square is one.
2. Next, Alan fixes the length $a_2$ of the second square.
3. Next, Alan calculates the length $a_n$ $(n > 2)$ by $2a_2a_{n-1} - a_{n-2}$. Do not ask why he chose such a formula; let us just say that he is a really peculiar young fellow.

For example, if Alan fixes $a_2 = 2$, then $a_3 = 8 - a_1 = 7$; see Figure 1. If Alan fixes $a_2 = 1$, then $a_n = 1$ holds for all $n \in \mathbb{N}$; see Figure 2.

Now Alan wonders if he can calculate the volume of tower of $N$ consecutive building bricks. Help Alan and write the program that computes this volume. Since it can be quite large, it is enough to compute the answer modulo given natural number $m$.

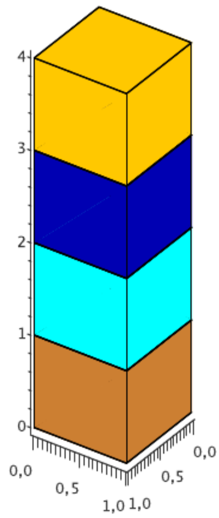

Figure 2: Tower of four bricks when Alan fixes $a_2 = 1$.

## Input

The input contains several test cases. The first line contains the number $t$ $(t \leq 10^5)$ denoting the number of test cases. Then $t$ test cases follow. Each of them is given in a separate line containing three integers $a_2$, $N$, $m$ ($1 \leq a_2$, $m \leq 10^9$, $2 \leq N \leq 10^9$) separated by a single space, where $a_2$ denotes the fixed length of second square in step 2, while $N$ denotes the number of bricks constructed by Alan.

## Output

For each test case $(a_2, N, m)$ compute the volume of tower of $N$ consecutive bricks constructed by Alan according to steps (1-3) and output its remainder **modulo** $m$.

## Sample Input

```
3
2 3 100
1 4 1000
3 3 1000000000
```

## Sample Output

```
54
4
299
```