A function table

Let $f(n) = 12345n^2 + 6789n + 1337$

Input

The first line of the input consist of a single integer number *t* which determines the number of tests.

In each of next *t* lines there is two integer numbers *n* and *m*.

Constraints

- $0 < t \le 100\,000$
- $0 \le n \le 50\,000\,000$
- $2 \le m \le 2\,000\,000\,000$

Output

Print the result of $f(n)$ modulo m.

Example

Input:
4
0 10000
1 10000
2 10000
1000 1000000007
Output:
1337
471
4295
351790253