Inverse of Recurrence Problem With a Square Root

Given this recurrence formula (be careful, it's in inverse form):

$$a_0 = 1;\ a_n = \frac{1}{16}\left(1 + 4a_{n+1} + \sqrt{1 + 24a_{n+1}}\ \right)$$

Given **n** ($0 \le \mathbf{n} < 2^{64}$) and **m** ($0 < \mathbf{m} < 2^{64}$), your task is to compute $\mathbf{a_n}$ modulo **m**.

It's guaranteed that $\mathbf{a_n}$ is always an integer.

Input

First line containing an integer **T** ($0 < \mathbf{T} \le 5 \times 10^4$), than **T** cases follow.

For each test case there are two integers **n** and **m**, written in one line, separated by a space.

Output

For each test case, output the required answer: $\mathbf{a_n}$ modulo **m**.

Example

Input:
10
0 10
1 10
2 10
3 10
10 10
100 100
1000 1000
10000 10000
100000 100000
9876543210123456789 1234567890987654321

Output:
1
2
5
5
5
51
251
6251
6251
657422418465782775

Time limit ~7x My program speed: Click here to see my submission history and time record for this problem

See also: Another problem added by Tjandra Satria Gunawan