Sum of geometric series (easy)

In the lecture, we gave you three algorithms of calculating the prefix sum of geometric series $\{ar^{n-1}\}$.

We would like you to implement Algorithm 2, whose time complexity is $O(n)$.

Given two integers r and n, please write a program that calculates the last 9 digits of $r + r^2 + \cdots + r^n$. Take a look at the 'Hints' section of the problem 'Bank of Braham'.

Input

Your input consists of an arbitrary number of lines, but no more than 100.

Each line contains two integers r $(1 \leq r < 10^9)$ and n $(1 \leq n \leq \mathbf{10^5})$.

The end of input is indicated by a line containing only the value -1.

Output

For each given input line, print the last 9 digits of $r + r^2 + \cdots + r^n$. Please print **exactly** 9 digits. If the answer is shorter than 9 digits, then print zeroes in the front of the answer to make it 9 digits.

Example

Standard input	Standard output
1 5 3 10 1941 19 -1	000000005 000088572 260192619

Time Limit

2 seconds.

Hints

This is algorithm 2.