

## 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  $r + r^2 + \dots + r^n$ . 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  $n$  ( $1 \leq n \leq 10^5$ ).

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  $r + r^2 + \dots + r^n$ . 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	000000005
3 10	000088572
1941 19	260192619
-1	

### Time Limit

2 seconds.

## Hints

This is algorithm 2.

### Counting the number of steps of an algorithm. (cont.)

- Algorithm 2.

# of steps

1. Make a variable *sum* with initial value 0, which stores the answer. +1

2. Make a variable *x* with initial value *a*. +1

3. Consider all  $i = 1, 2, \dots, n$ :

1. Add *x* to *sum*.

2. Multiply *x* by *r*.

$$\boxed{\begin{array}{c} +1 \\ +1 \end{array}} \} +2 \quad \sum_{i=1}^n 2 = 2n$$

- So Algorithm 2 needs  $1 + 1 + 2n = 2n + 2$  steps.