

Unique Numbers

Ankur Sir, getting bored in class thinks of something to pass his time. He writes all the numbers from 0 to $n-1$ and then does k operations on these numbers. The operations are of two type-

- 0 x - Replace each number i by $(i+x)\text{mod } n$
- 1 x - Replace each number i by $(i*x)\text{mod } n$

Now he wants to know how many unique numbers are there after each such operation and has asked for your help.

Note- Each operation is done on the numbers that we get after the previous operation and not on the original.

Input

First line contains n

Second line contains k , the number of operations

Each of the next k lines contain 2 integer p and x

Output

Output k lines, each containing how many unique numbers are left.

Constraints

$$1 \leq n \leq 10^8$$

$$1 \leq k \leq 20$$

$$0 \leq p \leq 1$$

$$0 \leq x \leq 10^8$$

Example

Input:

30

3

1 8

0 3

1 12

Output:

15

15

5