We have the following recursive function:

$$\begin{aligned} f(1) &= x \\ f(n) &= (a \cdot f(n-1) + c) \bmod m, \text{ with } n \geq 2, n \in \mathbb{Z}^+ \end{aligned}$$

Remember that the operation mod calculates the remainder of the integer division.

With the previous recursive function you should generate a sequence containing the first n elements, which are: $f(1)$, $f(2)$, $f(3)$, $f(4)$, $\ldots$, $f(n)$. Then, you should sort those numbers in ascending order (with respect to its value), so you can tell which number is located in the i-th position of the sorted sequence.

Input

There are several test cases. The first line of each test case has six integer numbers: a, c, m, x, q, n separated by spaces ($2 \leq a < m$, $0 \leq c < m$, $3 \leq m \leq 10^3$, $0 \leq x < m$, $1 \leq q \leq 10^4$, $1 \leq n \leq 10^8$). The remaining lines of each test case have q integer numbers. Each one corresponds to the position in the sorted sequence whose value wants to be known.

Output

For each query you should print a single line containing the integer number in the i-th position of the sorted sequence.

Sample Input

```
7 4 9 3 5 10
2
10
3
9
4
```

Sample Output

```
1
8
2
7
3
```