Counting subsequences

You are given a sequence $a_0a_1 \cdots a_{N-1}$ of digits and a prime number Q. For each i ≤ j with a_i != 0, the subsequence $a_ia_{i+1} \cdots a_j$ can be read as a decimal representation of a positive integer. Subsequences with leading zeros are not considered. Let F(k) be defined as the number of pairs (i, j) such that the corresponding subsequence is a multiple of Q and i,j ≤ k. You are to calculate F(k)*F(k+1)*...*F(N-1) where k is the minimum non-negative integer such that F(k) > 0. If for all 0 <= k < N, F(k) <= 0, consider this product to be 0. Since this number can be very big, output its remainder when divided by 1000000009.

Input
The input consists of at most 50 datasets. Each dataset is represented by a line containing four integers N, S, W, and Q, separated by spaces, where $1 \le N \le 10^5$, $1 \le S \le 10^9$, $1 \le W \le 10^9$, and Q is a prime number less than 10^8. The sequence $a_0 \cdots a_{N-1}$ of length N is generated by the following code, in which a_i is written as a[i].

```
int g = S;
for(int i=0; i<N; i++) {
    a[i] = (g/7) % 10;
    if( g%2 == 0 ) { g = (g/2); }
    else { g = (g/2) ^ W; }
}
```

Note: the operators /, %, and ^ are the integer division, the modulo, and the bitwise exclusiveor, respectively. The above code is meant to be a random number generator. The intended solution does not rely on the way how the sequence is generated.
The end of the input is indicated by a line containing four zeros separated by spaces.

Output
For each dataset, output the answer in a line.

Sample Input
3 32 64 7
4 35 89 5
5 555 442 3
5 777 465 11
100000 666 701622763 65537
0 0 0 0

Output for the Sample Input
2
32
18
6
281208690

In the first dataset, the sequence is 421. We can find two multiples of Q = 7, namely, 42 and 21. In the second dataset, the sequence is 5052, from which we can find 5, 50, 505, and 5 being the multiples of Q = 5. Notice that we don’t count 0 or 05 since they are not a valid representation of positive integers. Also notice that we count 5 twice, because it occurs twice in different positions.In the third and fourth datasets, the sequences are 95073 and 12221, respectively.