

1e16 Cities

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 1024 megabytes

There are 10^{16} cities, labeled $1, 2, \dots, 10^{16}$.

For distinct cities i, j , there is a bidirectional road between city i and city j if and only if $\text{lcm}(i, j) = A \cdot \text{gcd}(i, j) + B$.

Answer Q queries.

In the i -th query, an integer x_i is given. Output the bitwise XOR of the labels of all cities that are reachable from city x_i by traversing zero or more roads.

Input

The first line contains integers A, B in this order, separated by spaces. ($1 \leq A, B \leq 10^8$)

The second line contains an integer Q . ($1 \leq Q \leq 10^5$)

Each of the following Q lines contains an integer x_i for the i -th query. ($1 \leq x_i \leq 10^{16}$)

Output

Print Q lines.

On the i -th line ($1 \leq i \leq Q$), output the answer to the i -th query.

Examples

standard input	standard output
3 28 4 20 26 7 28	28 26 54 108
81781525 3945925 10 53907475 6160906250298067 3007621769603801 134161450 23675550 4034161385146811 2151358558435 12908151350610 112647860153451 9491287293575	53908389 6160906250298067 3007621769603801 9491260218029 2151369618045 4034161385146811 2151369618045 332851610359999 112647860153451 9491260218029

Note

For the first example, the existence of a road between cities i, j is equivalent to $\text{lcm}(i, j) = 3 \cdot \text{gcd}(i, j) + 28$.

- For the first query, the cities reachable from city 20 are 8, 20.
- For the second query, the only city reachable from city 26 is 26.

- For the third query, the cities reachable from city 7 are 7, 49.
- For the fourth query, the cities reachable from city 28 are 28, 112.

The bitwise XOR $x \oplus y$ of non-negative integers x, y is defined as follows.

- In the binary representation of $x \oplus y$, the digit at the 2^k ($k \geq 0$) place is 1 if and only if exactly one of the digits at the 2^k place in the binary representations of x and y is 1; otherwise, it is 0.

For example, $3 \oplus 5 = 6$ (in binary, $011 \oplus 101 = 110$).