# Math Problem

| | |
|---|---|
| Input file: | `standard input` |
| Output file: | `standard output` |
| Time limit: | 4 seconds |
| Memory limit: | 1024 megabytes |

Given two positive integers $n$ and $k$, you can perform the following two types of operations any number of times (including zero times):

- Choose an integer $x$ which satisfies $0 \le x < k$, and change $n$ into $k \cdot n + x$. It will cost you $a$ coins to perform this operation once. The integer $x$ you choose each time can be different.
- Change $n$ into $\lfloor \frac{n}{k} \rfloor$. It will cost you $b$ coins to perform this operation once. Note that $\lfloor \frac{n}{k} \rfloor$ is the largest integer which is less than or equal to $\frac{n}{k}$.

Given a positive integer $m$, calculate the minimum number of coins needed to change $n$ into a multiple of $m$. Please note that 0 is a multiple of any positive integer.

## Input

There are multiple test cases. The first line of the input contains an integer $T$ ($1 \le T \le 10^5$) indicating the number of test cases. For each test case:

The first line contains five integers $n$, $k$, $m$, $a$, $b$ ($1 \le n \le 10^{18}$, $1 \le k, m, a, b \le 10^9$).

## Output

For each test case output one line containing one integer, indicating the minimum number of coins needed to change $n$ into a multiple of $m$. If this goal cannot be achieved, output $-1$ instead.

## Example

| standard input | standard output |
|---|---|
| 4<br>101 4 207 3 5<br>8 3 16 100 1<br>114 514 19 19 810<br>1 1 3 1 1 | 11<br>2<br>0<br>-1 |

## Note

For the first sample test case, initially $n = 101$. The optimal steps are shown as follows:

- Firstly, perform the second type of operation once. Change $n$ into $\lfloor \frac{n}{4} \rfloor = 25$. This step costs 5 coins.
- Then, perform the first type of operation once. Choose $x = 3$ and change $n$ into $4 \cdot n + 3 = 103$. This step costs 3 coins.
- Then, perform the first type of operation once. Choose $x = 2$ and change $n$ into $4 \cdot n + 2 = 414$. This step costs 3 coins.
- As $414 = 2 \times 207$, $n$ is a multiple of $m$. The total cost is $5 + 3 + 3 = 11$ coins.

For the second sample test case, perform the second type of operation twice will change $n$ into 0. The total cost is $1 + 1 = 2$ coins.

For the third sample test case, as $n = 114 = 6 \times 19$ is already a multiple of $m$, no operation is needed. The total cost is 0 coins.