Error

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	512 megabytes

When doing integer multiplication modulo a composite number $M = \prod p_i^{t_i}$, we can accelerate the process by doing it separately for each coprime component $p_i^{t_i}$ of number M, and then combine the results to obtain the final answer with Cantonese Remainder Theorem (CRT).

Miserably, when the code was running, errors occurred in the calculation for one of the coprime components. That is, for some i, the result it got was incorrect modulo $p_i^{t_i}$, therefore after combination, the answer was wrong.

Given the two numbers A, B to multiply, along with the wrong answer C' and the modulo number M, you need to find the component on which the program failed.

Input

The first line contains a single number $T(1 \le T \le 10^6)$, the number of test cases.

T lines follow, each line contains 4 numbers $A, B, C', M(0 \le A, B, C' < M \le 10^{18})$, denoting a query.

Output

Print T lines. Each line contains a single number $p_i^{t_i}$, the component the program failed on.

Example

standard input	standard output
1 2 3 1 10	2

Note

$$M = 10 = 2^1 \times 5^1$$
$$(2 \times 3) \bmod 2^1 = 0 \neq 1$$
$$(2 \times 3) \bmod 5^1 = 1$$

Therefore, the answer is 2^1.