A function over factors

A function f is defined over natural numbers as:

$$f(N) = \sum d_i\, \mu(d_i)$$

Here the summation is over d_i, all positive integers which are factors of N.

$\mu(n)$ is the [Möbius function](#) defined in the following way: If there exists a prime p such that p^2 is a factor of n, then $\mu(n)=0$. Otherwise, if n has an odd number of prime factors, $\mu(n)=-1$. If not, $\mu(n)=1$. Thus the first few values for $\mu(n)$ (starting from 1) are 1, -1, -1, 0, -1, 1, -1, 0...

Given an integer X ($0 <= X <= 10^{12}$), find the smallest natural number N such that $|f(N)|>X$.

Input

The first line of the input contains T, the number of test cases (T <= 1000). Following this are T lines, each containing an integer X ($0 <= X <= 10^{12}$) corresponding to the test case.

Output

For each test case in the input, output the smallest natural number N such that $|f(N)|>X$.

Example

Input:
2
1
2

Output:
3
5