Project Euler #200: Find the 200th prime-proof squbе containing the contiguous sub-string "200"

This problem is a programming version of Problem 200 from projecteuler.net

We shall define a squbе to be a number of the form, p^2q^3, where p and q are distinct primes.
For example, $200 = 5^2 2^3$ or $120072949 = 23^2 61^3$.

The first five squbеs are 72, 108, 200, 392, and 500.

Interestingly, 200 is also the first number for which you cannot change any single digit to make a prime; we shall call such numbers, prime-proof. The next prime-proof squbе which contains the contiguous sub-string "200" is 1992008. Note that changing a digit may result in appearance of the leading zeroes - in the case with 200 as a number we can change the first digit 2 to 0, but the resulting number $000 = 0$ is not a prime number and doesn't change the fact that 200 is prime-proof.

You're given the contiguous sub-string s and some queries n_i. For each query, find the n_i-th prime-proof squbе containing the contiguous sub-string s.

Input Format

The first line of each file contains s which is the sub-string from the problem statement. Next line contains a single integer q which is the number of queries per test file. q lines follow, each containing the corresponding n_i.

Constraints

- s is a string representation of some number between 100 and 999
- $1 \leq q \leq 25000$
- $1 \leq n_i \leq 10^6$
- For each query, the answer is less than 10^{15}.

Output Format

Print exactly q lines with the answers for the all q queries on each.

Sample Input 0

```
200
2
1
2
```

Sample Output 0

```
200
1992008
```

Sample Input 1

```
632
3
1
3
2
```

Sample Output 1

```
42632
963272
256328
```