

# Project Euler #183: Maximum product of parts

This problem is a programming version of [Problem 183](#) from [projecteuler.net](#)

Let  $N$  be a positive integer and let  $N$  be split into  $k$  equal parts,  $r = n/k$ , so that  $N = r + r + \dots + r$ .

Let  $P$  be the product of these parts,  $P = r \times r \times \dots \times r = r^k$ .

For example, if 11 is split into five equal parts,  $11 = 2.2 + 2.2 + 2.2 + 2.2 + 2.2$ , then  $P = 2.2^5 = 51.53632$ .

Let  $M(N) = P_{max}$  for a given value of  $N$ .

It turns out that the maximum for  $N = 11$  is found by splitting eleven into four equal parts which leads to  $P_{max} = (11/4)^4$ ; that is,  $M(11) = 14641/256 = 57.19140625$ , which is a terminating decimal.

However, for  $N = 8$  the maximum is achieved by splitting it into three equal parts, so  $M(8) = 512/27$ , which is a non-terminating decimal.

Let  $D(N) = N$  if  $M(N)$  is a non-terminating decimal and  $D(N) = -N$  if  $M(N)$  is a terminating decimal.

For example,  $\sum D(N)$  for  $5 \leq N \leq 100$  is 2438.

Find  $\sum D(N)$  for  $5 \leq N \leq n$ .

## Input Format

The first line of each test file contains  $q$  which is the number of test cases.  $q$  lines follow, each containing the number  $n$  for a given test case.

## Constraints

- $1 \leq q \leq 10^5$
- $5 \leq n \leq 10^6$

## Output Format

Print exactly  $q$  lines with a single integer on each line i.e. the answer to the corresponding test.

## Sample Input 0

```
1
100
```

## Sample Output 0

