



Problem C
Primes

Input File: C.in
Output File: standard output
Time Limit: 1 second (C/C++)
Memory Limit: 256 megabytes

Define a *mass split* operation for the multiset of positive integers \mathbf{K} : for each integer k_i in the multiset we will replace it with the pair d_i and k_i/d_i , where d_i is the random integer divisor of k_i , which is greater than 1, and less than k_i . If k_i is prime, it remains untouched. All divisors can be chosen equiprobably.

For example, let's take the multiset $\{2, 10, 12, 12\}$. Then $\{2, 2, 3, 3, 4, 4, 5\}$, $\{2, 2, 2, 3, 4, 5, 6\}$ and $\{2, 2, 2, 2, 5, 6, 6\}$ will be the possible outcomes of the first mass split (first and third with probability 0.25, second with probability 0.5), and $\{2, 2, 2, 2, 2, 2, 3, 3, 5\}$ will be the only possible outcome of the second mass split.

If we start with a multiset containing one integer \mathbf{N} , find the expected number of mass splits needed to obtain a multiset with prime numbers only, where the expected number is the probability-weighted average of all possible values.

Input

First line of the input contains integer \mathbf{T} ($1 \leq \mathbf{T} \leq 10^4$) – number of test cases. Each test case consists of one integer \mathbf{N} – the starting multiset ($2 \leq \mathbf{N} \leq 10^{10}$).

Output

For each test case, print one number – the expected number of mass splits, with absolute or relative error not worse than 10^{-6} .

Sample input	Sample output
3	0
3	2.0
12	3.3333333
48	