

















Fundamentals Challenges

Leonardo's Prime Factors



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Problem Submissions Leaderboard Discussions Editorial

Leonardo loves primes and created q queries where each query takes the form of an integer, n. For each n, he wants you to count the maximum number of unique prime factors of any number in the inclusive range [1, n] and then print this value on a new line.

Note: Recall that a prime number is only divisible by 1 and itself, and 1 is not a prime number.

Input Format

The first line contains an integer, q, denoting the number of queries. Each line i of the q subsequent lines contains a single integer, n.

Constraints

- $1 \le q \le 10^5$
- $1 \le n \le 10^{18}$

Output Format

For each query, print the maximum number of unique prime factors for any number in the inclusive range [1, n] on a new line.

Sample Input

6

1 2

3

500

5000

10000000000

Sample Output

0

1

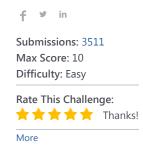
4

10

Explanation

- 1. The maximum number of unique prime factors of any number in the inclusive range [1,1] is 0, because 1 is not prime and its only factor is itself.
- 2. The maximum number of unique prime factors of any number in the inclusive range [1,2] is 1. We already know that the number 1 has 0 prime factors, but 2 has 1 prime factor (itself).
- 3. The maximum number of unique prime factors of any number in the inclusive range [1,3] is 1. The number 3 has 1 prime factor (itself), and we already know that the number 2 has 1 prime factor and the number 1 has 0 prime factors.

4. The maximum number of unique prime factors in the inclusive range [1,500] is **4**. The product of our first four unique primes is $2 \times 3 \times 5 \times 7 = 210$, and there are no additional unique primes we can multiply that number by that results in a value ≤ 500 .



```
C#
 Current Buffer (saved locally, editable) & 🗗
                                                                                                                             *
 1 using System;
   using System.Collections.Generic;
 3 using System.IO;
 4 ▼ class Solution {
        static void Main(String[] args) {
 5 ₹
            /* Enter your code here. Read input from STDIN. Print output to STDOUT. Your class should be named Solution
 6
 7
 8
 9
             int[] primes = { 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47 };
10
11
                int q = int.Parse(Console.ReadLine());
12
                while (q-->0)
13
14 ▼
15
                      long n = long.Parse(Console.ReadLine());
16
                      //long n=10000000000;
17
18
                     int cont = 0;
19
                     long prod = 1;
21
                     for (int i = 0; i < primes.Length; i++)
22 ▼
23
                         prod *= primes[i];
24
                         if (prod <= n)</pre>
25
                         {
26
                             cont++;
27
28
                     }
29
30
                     Console.WriteLine(cont);
31
                }
32
33
34
35
36
37
        }
   }
38
                                                                                                                   Line: 32 Col: 1
```

<u>**1**</u> <u>Upload Code as File</u> □ Test against custom input

Run Code

Submit Code

Congrats, you solved this challenge!

✓ Test Case #0✓ Test Case #3

✓ Test Case #1

Test Case #2

✓ Test Case #4

✓ Test Case #5

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- ✓ Test Case #6
- ✓ Test Case #9
- ✓ Test Case #12
- Test Case #15
- ✓ Test Case #18

- ✓ Test Case #7
- ✓ Test Case #10
- ✓ Test Case #13
- ✓ Test Case #16

- ✓ Test Case #8
- ✓ Test Case #11
- ✓ Test Case #14
- ✓ Test Case #17

Next Challenge

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