



Leonardo's Prime Factors

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Problem

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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

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

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
1
4
5
10
```

Explanation

- 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.
- 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).
- 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 .

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Max Score: 10




Difficulty: Easy

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★★★★★ Thanks!

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C#   

```
1 using System;
2 using System.Collections.Generic;
3 using System.IO;
4 class Solution {
5     static void Main(String[] args) {
6         /* Enter your code here. Read input from STDIN. Print output to STDOUT. Your class should be named Solution
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
13         while (q-- > 0)
14         {
15             long n = long.Parse(Console.ReadLine());
16             //long n=10000000000;
17
18             int cont = 0;
19             long prod = 1;
20
21             for (int i = 0; i < primes.Length; i++)
22             {
23                 prod *= primes[i];
24                 if (prod <= n)
25                 {
26                     cont++;
27                 }
28             }
29
30             Console.WriteLine(cont);
31         }
32     }
33 }
34
35
36
37
38 }
```

Line: 32 Col: 1

 [Upload Code as File](#)☐ Test against custom input

Run Code

Submit Code

Congrats, you solved this challenge!

✓ Test Case #0

✓ Test Case #3

✓ Test Case #1

✓ Test Case #4

✓ Test Case #2

✓ Test Case #5

✓ 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

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