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| --- | --- |
| **divisor**    Problem code: DS15 | * [SUBMIT](https://www.codechef.com/submit/DS15) * [MY SUBMISSIONS](https://www.codechef.com/status/DS15,nacho0monllor) * [ALL SUBMISSIONS](https://www.codechef.com/status/DS15) |

**All submissions for this problem are available.**

**Background**

Given a natural number n, find the summation of all its proper divisors.  
Definition: A proper divisor of a natural number is the divisor that is strictly less than the number. e.g. number 20 has 5 proper divisors: 1, 2, 4, 5, 10, and the divisor summation is: 1 + 2 + 4 + 5 + 10 = 22.

**Input:**

An integer stating the number of test cases T and that many lines follow, each containing natural number n for which output will be summation of all its proper divisors.

**Output:**

One integer each line: the divisor summation of the integer given respectively.

**Constraints**

1<=T <=200000  
1 <= n <= 500000

**Sample Input**

3

2

10

20

**Sample Output**

1

8

22

<https://www.codechef.com/problems/DS15>

//https://www.codechef.com/problems/PD13

//VIDEO CON LA FORMULA

//https://www.youtube.com/watch?v=ehlnfUbfxjs

using System;

using System.Collections.Generic;

using System.Linq;

using System.Text;

namespace ConsoleApplication1

{

class Program

{

static void Main(string[] args)

{

int t = int.Parse(Console.ReadLine());

while (t-- > 0)

{

long n = long.Parse(Console.ReadLine());

long copia = n;

int[] primos = { 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97, 101, 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173, 179, 181, 191, 193, 197, 199, 211, 223, 227, 229, 233, 239, 241, 251, 257, 263, 269, 271, 277, 281, 283, 293, 307, 311, 313, 317, 331, 337, 347, 349, 353, 359, 367, 373, 379, 383, 389, 397, 401, 409, 419, 421, 431, 433, 439, 443, 449, 457, 461, 463, 467, 479, 487, 491, 499, 503, 509, 521, 523, 541, 547, 557, 563, 569, 571, 577, 587, 593, 599, 601, 607, 613, 617, 619, 631, 641, 643, 647, 653, 659, 661, 673, 677, 683, 691, 701, 709, 719, 727, 733, 739, 743, 751, 757, 761, 769, 773, 787, 797, 809, 811, 821, 823, 827, 829, 839, 853, 857, 859, 863, 877, 881, 883, 887, 907, 911, 919, 929, 937, 941, 947, 953, 967, 971, 977, 983, 991, 997};

//Console.WriteLine(primos.Length);

Dictionary<long, long> diccio = new Dictionary<long, long>();

int i = 0;

//int divisor = primos[i];

int veces =0;

while (n > 1)

{

if (i<primos.Length && n % primos[i] == 0)

{

//factors.add(divisor);

n /= primos[i];

veces++;

}

else

{

diccio[primos[i]] = veces;

veces = 0;

i++;

}

if (i >= primos.Length)

{

diccio[n] = 1;

break;

}

}

//Console.WriteLine(i);

if (veces > 0)

{

diccio[primos[i]] = veces;

}

long answer = 1;

foreach (KeyValuePair<long, long> kvp in diccio)

{

//Console.WriteLine(kvp.Key + " - " + kvp.Value);

answer \*= (long)(Math.Pow(kvp.Key, kvp.Value + 1) - 1) / (kvp.Key - 1);

}

answer -= copia;

Console.WriteLine(answer);

}

Console.ReadLine();

}

}

}