

# Project Euler #88: Product-sum numbers

## Problem Statement

This problem is a programming version of [Problem 88](#) from [projecteuler.net](#)

A natural number,  $N$ , that can be written as the sum and product of a given set of at least two natural numbers,  $a_1, a_2, \dots, a_k$ , is called a product-sum number:  $N = a_1 + a_2 + \dots + a_k = a_1 \times a_2 \times \dots \times a_k$ .

For example,  $6 = 1 + 2 + 3 = 1 \times 2 \times 3$ .

For a given set of size,  $k$ , we shall call the smallest  $N$  with this property a minimal product-sum number. The minimal product-sum numbers for sets of size,  $k = 2, 3, 4, 5$ , and  $6$  are as follows.

$$k = 2 : 4 = 2 \times 2 = 2 + 2$$

$$k = 3 : 6 = 1 \times 2 \times 3 = 1 + 2 + 3$$

$$k = 4 : 8 = 1 \times 1 \times 2 \times 4 = 1 + 1 + 2 + 4$$

$$k = 5 : 8 = 1 \times 1 \times 2 \times 2 \times 2 = 1 + 1 + 2 + 2 + 2$$

$$k = 6 : 12 = 1 \times 1 \times 1 \times 1 \times 2 \times 6 = 1 + 1 + 1 + 1 + 2 + 6$$

Hence for  $2 \leq k \leq 6$ , the sum of all the minimal product-sum numbers is  $4 + 6 + 8 + 12 = 30$ ; note that 8 is only counted once in the sum.

In fact, as the complete set of minimal product-sum numbers for  $2 \leq k \leq 12$  is 4, 6, 8, 12, 15, 16, the sum is 61.

What is the sum of all the minimal product-sum numbers for  $2 \leq k \leq N$ ?

## Input Format

First and only line contains an integer  $N$ .

## Constraints

$$10 \leq N \leq 2 \times 10^5$$

## Output Format

Print the required answer.

## Sample Input

12

## Sample Output

61