CCC '13 S5 - Factor Solitaire

Time limit: 1.0s **Memory limit:** 256M

Canadian Computing Competition: 2013 Stage 1, Senior #5

In the game of Factor Solitaire, you start with the number 1, and try to change it to some given target number n by repeatedly using the following operation. In each step, if c is your current number, you split it into two positive factors a, b of your choice such that $c = a \times b$. You then add a to your current number c to get your new current number. Doing this costs you b points.

You continue doing this until your current number is n, and you try to achieve this at the cost of a minimum total number of points.

For example, here is one way to get to 15:

- start with 1
- change 1 to $1 + 1 = 2$ — cost so far is 1
- change 2 to $2 + 1 = 3$ — cost so far is $1 + 2$
- change 3 to $3 + 3 = 6$ — cost so far is $1 + 2 + 1$
- change 6 to $6 + 6 = 12$ — cost so far is $1 + 2 + 1 + 1$
- change 12 to $12 + 3 = 15$ — done, total cost is $1 + 2 + 1 + 1 + 4 = 9$.

In fact, this is the minimum possible total cost to get 15. You want to compute the minimum total cost for other target end numbers.

Input Specification

The input consists of a single integer $N \geq 1$. In at least half of the cases $N \leq 50\,000$, in at least another quarter of the cases $N \leq 500\,000$, and in the remaining cases $N \leq 5\,000\,000$.

Output Specification

Compute the minimum cost that gets you to N.

Sample Input 1

```
15
```

Output for Sample Input 1

```
9
```

Sample Input 2

```
2013
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Output for Sample Input 2

```
91
```

Explanation of Output for Sample Input 2

For example, start with 1, then get to 2, 4, 5, 10, 15, 30, 60, 61, 122, 244, 305, 610, 671, 1342, and then 2013.