**Problem Statement**

Deadfish+ is a programming language with only 4 commands. All commands modify a single register. The register is initially set to zero, and during the execution of a program it can store an arbitrarily large integer value. The commands are:

    "i" - increment the value,

    "d" - decrement the value,

    "s" - square the value, and

    "p" - sort the digits of the number into non-increasing order (i.e., biggest to smallest).

For example, "p" changes 4070 to 7400, and it changes -4070 to -7400 (the minus sign is preserved).

You are given an N. Return the minimal number of commands necessary to make the register hold the number N.

**Definition**

Class:
Deadfish
Method:
shortestCode
Parameters:
int
Returns:
int
Method signature:
int shortestCode(int N)
(be sure your method is public)

**Limits**

Time limit (s):
2.000
Memory limit (MB):
256

**Constraints**

- N will be between 1 and 200,000, inclusive.

Examples

0)

3

Returns: 3

The fastest way to get to 3 is "iii" - three increments.

1)

5

Returns: 4

One fastest way to get a 5 is "iisi": two increments to get a 2, square to get a 4 and one more increment.

Another optimal way is "ddsi": two decrements change the register to -2, squaring that gives 4, and the final increment changes it to 5.

2)

15

Returns: 5
The fastest way to get 15 is "iissd". The value in the register will change as follows: 0, 1, 2, 4, 16, 15.
3)
61
Returns: 5
The fastest way to get 61 is "iissp". The value in the register will change as follows: 0, 1, 2, 4, 16, 61.
4)
200000
Returns: 207