



# Alternative Encryption

Time limit: 1s    Problem Author: Thomas Beuman

- This is a multi-pass problem. Your program will be run twice for each test case.
- In the first pass, encrypt  $n \leq 1000$  strings with lengths up to 100.
- The encrypted text should have the same number of letters as the original text.
- For all  $i$ , the  $i$ th letter of the encrypted text should differ from the  $i$ th letter of the original text.
- In the second pass, your program will be given the strings as encrypted by the first pass, which it should then decrypt to retrieve the original input.
- Your submission may take up to 1 second for each pass.
- A testing tool is provided to help you develop your solution.



The enigma, an encryption machine that solves this problem.  
CC BY 2.0 by William Warby on Wikimedia Commons

Sample Input	Pass 1	Sample Output
encrypt 3 plaintext nwerc correct		encrypted delft balloon

Sample Input	Pass 2	Sample Output
decrypt 3 encrypted delft balloon		plaintext nwerc correct



## Blackboard

Time limit: 6s    Problem Author: Takuki Kurokawa

- A blackboard has  $n \leq 10\,000$  positive integers with values up to  $10^9$  written on it.
- One at a time, split a number  $x$  into two smaller positive *real* numbers  $y$  and  $z$ , such that  $x = y + z$ .
- Output the minimum number of operations required to ensure that the largest value on the blackboard is at most  $0 \leq k \leq 100$  percent larger than the smallest value.

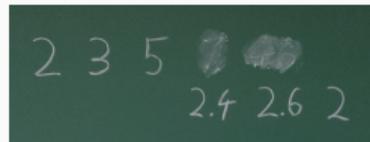
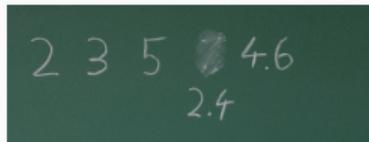


Illustration of Sample Input 1.

The 7 can be replaced by 2.4 and 4.6.

The 4.6 can in turn be replaced by 2.6 and 2.

Finally, the 5 can be replaced by 2.3 and 2.7.

After that, the largest value (3) is 50% larger than the smallest value (2).



## Consolidating Windows

Time limit: 1s    Problem Author: The NWERC 2024 jury

- It is expensive to have many windows, so you want to combine two square windows with side lengths up to  $10^9$  into a single, larger square window.
- Calculate the side length of a square window that has the same area as two smaller square windows combined.
- For example, when the two smaller windows have side lengths 3 and 4, the combined window with the same area has side length 5.



Bricked-up windows.  
CC BY 3.0 by Roger Veringmeier